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The Auburn Mill at Reno, Nevada.

THE following account of affairs at Reno is taken from the correspondence of the Carson City, Nevada, *State Register*, and contains the latest intelligence we have received concerning the operation of the Stetefeldt Company. The mill and lands of the Nevada Land and Mining (limited) furnace are situated just north of the town of Reno, and are wholly owned by parties in England. With this mill site they own 900 acres of land, secured by United States patent, and lying principally in the valley of the Truckee. This land is fenced and most of it has been cultivated for several years. The mill is about a mile and a half from the town in a northerly direction, while the farm runs down into the northern suburbs of the place. The road from the railroad depot to the mill is perfectly level and never becomes muddy.

In its internal arrangement the Auburn mill does not differ materially from the first-class mills now in operation on Carson river, except that the ores are crushed dry, while the mills of the Carson are built for wet crushing. The whole of the machinery of the mill is driven by water power. The water wheel is 32 feet in diameter, and 22 feet in length. It is what is called a breast wheel. The mill contains 20 stamps, 12 amalgamating pans and six large wooden settlers, and is capable of working 20 tons of ore per day. The pans do not differ materially from those in general use except that they are lined with wooden staves, to guard their sides against the corrosive elements found in the base metal ores that are worked in the mill. In the settlers wooden mullers are used, and on the sides of these large settling tubs are placed stationary wings to break the current created by the revolving mullers. The tailings flowing from the settlings when they are discharged are caught in tanks and reservoirs situated some distance below the mill, and some day will be worked over. From the ore house to the sluices that carry away the tailings everything moves down hill so far as the batteries, pans and settlers are concerned, the mill being built in that terraced style seen in all of our leading reduction works. As the ores are crushed dry, a drying kiln is used to expel whatever moisture they may contain. Before being shoveled upon the kiln they are spread out upon the floor of the front part of the ore house where a good deal of moisture evaporates, there being a free circulation of air through this part of the building. After the ore has passed through the batteries the fine dust resulting is carried by an endless belt provided with scrapers to a receiver when it is taken up by an elevator, similar to those seen in flouring mills, and carried to the top of the furnace.

The Stetefeldt furnace is quite simple in construction and is built of common brick, with a floor and fire chambers of the same. The furnace is about thirty feet in height and the opening in the interior is four feet square. At the back of the furnace are the doors opening into the fire chambers, which are situated on either side of the furnace stack, and from these chambers are openings to the interior of the furnace. There being a strong draught the flames from the fire chambers on either side rush out and meet, when, as one sheet of flame, they ascend to near the top of the furnace to an opening which connects with a smaller furnace having a downward draught. Down this go the flames to the chimney, which at this point lies flat on the ground. This flue, or branch of the main furnace has its fire chamber, but the flames coming into it descend into the chimney instead of rising as in the main furnace. The object of introducing a fire chamber in this flue is to roast such part of the crushed ore as may be drawn in the opening near the top of the main furnace and which would otherwise escape the flames. It is only necessary to rake the roasted ore from the hearth of this supplementary furnace about once a day. I have said above that after leaving this branch of the furnace the flames, fumes and smoke pass into the chimney, but more correctly speaking, they pass into what are called the dust chambers, which are from 12 to 14 feet in length, 7 or 8 feet high, and about 5 feet in width. From the dust chambers the chimney—still running horizontally—passes under the ore drying kiln, going up on one side and down on the other, thus heating the kiln and economizing fuel. After leaving the kiln the chimney runs in a direct line up the bluff in the rear of the mill and ends in a perpendicular stack about 25 feet in height. The chimney rests upon the ground, and is 240 feet in length. It is carried to this distance not only in order to secure sufficient draught for the furnace, but also to convey to a distance from the works the poisonous gases freed from the ores operated on in the furnace.

I have already stated that the crushed ore upon coming from the batteries is carried by means of an elevator to the top of the furnace—I now propose to follow the ore through the furnace to the amalgamating pans. Covering the opening in the top of the furnace is a large stationary sieve, and working upon this is a sieve which has a motion back and forth of some three or four inches. By this arrangement of double sieves, the ore is sifted into the furnaces, but there is no upward draught and no flame can get out at the top. The crushed ore is fed into the sieve and thence into the furnace as fast as it comes from the batteries. The salt used is put into the batteries, and being crushed with the ores is very thoroughly mixed with them by the time they have reached the top of the furnace. In working some very intractable ores, charcoal as well as salt is put into the batteries during their crushing. Having seen the crushed ore sifted in at the top of the furnace we will now go to the bottom and see it come down. Looking in at the iron door which opens on a level with the floor or hearth of the furnace, the whole interior of the furnace appears to be a mass of flame through which is seen a constantly descending shower of glowing and scintillating particles of ore. The heat from the flames of the wood burning in the fire chambers is very fierce, but their fierceness is greatly increased by the decomposition of the salt introduced and the burning of the sulphur contained in the ores. After falling to the bottom of the floor the ore retains its heat and is allowed to remain in a red glowing mass until it has accumulated to the depth of a foot or more, when it is raked out upon the brick floor in front of the furnace and cold water thrown upon it by means of hose. Being cooled it is wheeled to the platform over the pans into which it now goes for amalgamation in the usual manner, though with some ores certain chemicals are put into the pans.

EFFICIENCY OF THE FURNACE.

In working galena ores from 20 to 60 per cent. of the lead, according to the nature of the ore operated upon, is rendered inoperative as regards the subsequent amalgamation; antimony is nearly all burned out and in working ores containing copper nearly the whole of the metal is changed into an oxide not affected by quicksilver in the after process of amalgamation. In passing through the furnace with the salt the silver contained in the ores is chlorodized, or at least the greater part of it; in fact, the chlorodization amounts to from 75½ to 94 per cent. of the silver. Once the silver has been changed from its original form in the ore, whatever that may have been, to the chloride, it amalgamates very readily. The average yield of all the base metal ores worked at the Auburn mill has been 91½ per cent. of the assay.

The mill is now running on ores from Salt Lake. These ores are rich—running from $200 to $500 per ton—but very refractory. The ore they were working at the time I visited the mill looked about like so much dirt dug almost anywhere along the Geiger Grade; yet it would go $300 or $400 per ton. The gangue is brown earth, mixed with carbonate and oxide of lead, the whole mass having such a mean, dirty appearance that no one would suspect that it contained silver. The mill company purchase nearly all the ores worked in their mill, paying a fixed price according to the richness of the ores. When ores are brought to the mill in very large lots, say about 300 tons, they will be worked for $30 per ton. They cannot bother with cleaning up small lots of ore.

Mr. OTTOCKAR HOFMAN, assayer and metallurgist, has charge of the assay office and the bullion smelting department. When not engaged in melting down bullion and moulding and assaying silver bricks, he is constantly assaying and experimenting upon the ores that are being worked in the mill—taking samples from the ore house, from the batterics, from the ore as it falls through the flames in the furnace, from the top and from the bottom of the glowing heap on the floor of the furnace, and, in short, testing the ores at every stage of their reduction and in every possible manner. The business office, assay office and bullion smelting furnace are all in a long frame building standing a few rods north of the mill.

All told there are some sixteen buildings about the mill. The house of the Superintendent is three or four hundred yards north of the mill, and is very neatly furnished. Its parlor is a very comfortable lounging place, as it contains a regular old-fashioned fireplace. In front of the building is a large garden, which was being planted at the time of my visit. There is a large brick blacksmith shop near the mill, a large boarding house, a barn and carriage house, store house, and several houses for the workmen and their families. The principal buildings are neatly painted, and the grounds about the little village present a neat appearance.

The water by which the mill is driven is taken from the Truckee, and flows through a ditch three and a quarter miles long and fourteen feet in width. The tail-race is two and a quarter miles in length, making a total of five and a half miles of ditch. At the point where the water is taken from the river the stream is split into two branches, and in order to turn it into the ditch it was only necessary to build a slight brush dam. At present there is much more water flowing through the ditch than is required for driving the mill. After leaving the mill the water is sold to the ranchmen below for use in the irrigation of their lands.

The affairs of the company—the title in full of which is the "Nevada Land & Mining Company"—appear to be in a flourishing condition at present. The mill was built about seven years ago, and is a most substantial and well-arranged structure, but it never did much profitable work or had a reputation outside of Reno until after the introduction of the Stetefeldt furnace. Mr. FRANK F. OSBISTON is superintendent of all the affairs of the company in this State, and will one of these days astonish the "Johnny Bulls" by making it necessary for them to declare a dividend. Mr. CHARLES DURNING is foreman of the mill and superintends the working of the furnace. He formerly had charge of the ore roasting department of the old Central mill, in this city, though the furnaces used in that mill were of a very different kind from the Stetefeldt, being what are called reverberatory furnaces. The mill is in perfect working order. There is a good stock of wood on hand for the fires of the furnace and for use under the boiler (for heating water to be used in the amalgamating pans). Ores are coming in from Salt Lake and various sections of this State, and we see no reason why the mill should not now prove a paying institution. Four foot wood delivered at Reno costs but $4 per cord, and the slab wood which they are now using costs but $2 75 per cord. It appears to answer every purpose.

In conclusion, I may say that in my opinion the millmen of the base metal districts of the eastern and southeastern parts of this State would do well to examine the Stetefeldt furnace, and it can be seen doing its work to perfection at the Auburn mill. It is quite evident, when we compare the results they obtain in their mills with the assays of their ores, that they are losing a very large per cent. of the silver they contain, in some instances nearly or quite half, as at the Hot Creek mines, for instance. In purchasing ores the mill company act very fairly. A sample is obtained from the lot of ore by taking a little here and a little there from a large quantity as it lies spread out upon the floor of the ore house. This sample is thoroughly mixed, when it is divided into three parcels. One of these is assayed, and the price paid for the whole batch of ore is regulated by the result of this assay; another parcel is given to the owner of the ore, and the third is labeled and kept in the office. In case the owner of the ore is not satisfied with the assay made by the company, he takes his parcel to some competent assayer and has it assayed, and in case it goes much higher than the assay made by the mill company, he goes to them with his certificate and informs them of the fact. The third parcel is then taken to some assayer upon whom the owner of the ore and the mill company agree, and if this assay should come nearer to that made by the company than to that obtained by the owner of the ore, the latter pays for the assay, and that is the end of it; but in case it should more nearly approach the assay obtained by the person to whom the ore belonged, the mill company give him a check for the difference, and the matter is settled.

The Last of the Alchemists.

IN the latter part of the last century, JAMES PRICE was a distinguished amateur chemist in England, and a Fellow of the Royal Society. He had a private laboratory at his residence in Guildford, where he devoted much of his time to alchemy, which still found an occasional devotee even among scientific men. In 1782, Mr. PRICE imagined that he had discovered a powder that would transmute mercury and other of the baser metals into gold and silver. He appears to have hesitated about giving the results of his experiments to the public, but the chemists soon got wind of the matter through some of his intimate friends whom he had made his confidants. This led to a lively discussion of his pretensions in scientific circles, and many were disposed to accuse him of deliberate imposture. To prove that he was no charlatan, PRICE offered to repeat his experiments in presence of a select company of men, competent to pass judgment upon them, and above the suspicion of being in collusion with him, and arrangements were made for the ordeal. The experiments, seven in number, began at Guildford on the 6th of May, 1782, and were completed on the 25th. In all of them gold and silver were apparently obtained from mercury, and this transmutation was attested by the peers, clergymen, lawyers, and chemists who had watched the process. Some of the gold was presented to the King (George III.) who graciously consented to accept the marvellous gift. The University of Oxford hastened to do honor to the successful alchemist, by conferring upon him the degree of M. D.; and a book in which he published an account of his experiments ran through two editions in a few months.

If all this were not matter of sober history, we could hardly believe that it occurred less than ninety years ago; but it must be borne in mind that alchemy, after its many centuries of re-

nown as an occult science, was dying a lingering death, and chemistry, the infant daughter of the venerable juggler, was still in its cradle. But though the King had recognized PRICE as a public benefactor, and Oxford had honored him as a scientific discoverer, there were men wise enough to see that he must be either a deceiver or self-deceived. His position and standing were decidedly against the former view. He was no needy and nameless adventurer, like most of the professed alchemists of that day, but a man of wealth and good family, who had devoted himself to chemistry out of pure love of science, and whose private character was above reproach. The case was a peculiar and perplexing one, and even now it remains somewhat of a mystery. At the time it became the subject of controversy so earnest and bitter that at length the Royal Society felt obliged to call upon PRICE to repeat his experiments in their presence, and thus prove to the satisfaction of his brother fellows the truth of his pretensions.

Up to this time, we may doubt whether he was honest or not, but now it is quite evident that if he had deceived himself, the delusion is at an end, but he hopes to evade the mortification of acknowledging it. He declines to repeat his experiments, on the ground that the preparation of the mysterious powder is difficult and dangerous to health. He has found also, he says, that this method of making the precious metals, though interesting for its scientific bearings, cannot become practically useful, as the amount obtained will not cover the cost of production. In one case, as he states, it cost him about seventeen pounds sterling to prepare gold to the value of four pounds. He urged, moreover, that the experiments had already been performed before honorable and competent witnesses, and nothing could be gained by repeating them; "for, as the spectators of a fact must always be less numerous than those who hear it related, so the majority must at last believe, if they believe at all, on the credit of attestation." He claimed further that his character and his scientific reputation ought to be a sufficient assurance to his friends that he had not deceived them. The Royal Society nevertheless insisted that his own honor and theirs required that the experiments should be repeated, and he finally left London for Guildford in January, 1783, promising to return in a month fully prepared for the trial.

At Guildford PRICE shut himself up in his laboratory, distilled a quantity of laurel water, the quickest and deadliest poison then known, and made his will. He then went to work to prepare the powder of transmutation. Six months passed away, and even his best friends began to think that he had deceived them, when he suddenly appeared in London and formally invited the Royal Society to meet him at his laboratory at Guildford, on the 3d of August. A year earlier the *élite* of England had assembled to witness his wonderful alchemy, but on this occasion only three members of the Royal Society came to Guildford in response to his invitation. After receiving them with a cordial welcome, PRICE stepped aside for a moment, and hastily drank a flask of laurel-water. His visitors, observing a sudden change in his appearance, though they did not then suspect the cause, sent in haste for medical assistance; but in a few minutes the unfortunate man was dead.

As we have intimated, there are many who believe that the experiments of PRICE were an imposture from the outset; but it seems to us more probable that he was at first the victim of some unaccountable delusion, and that he had recourse to deception afterwards, simply because he had not the moral courage to confess his error after having published it to the world as a great discovery. This explanation of his conduct is not without its difficulties, but the same may be said of every view that can be taken of it, and on the whole this is the most plausible solution of the enigma.

"Thus it was," to quote the words of another, "that alchemy, among scientific men at least, in England, came to an end with the last act of a tragedy." In Germany, on the other hand, its final appearance on the stage was rather as a comedy; but that tale we must postpone to another day.—*Boston Journal of Chemistry.*

Spectrum Analysis in Relation to the Bessemer Process.

A lecture upon this interesting subject, by Professor ROSCOE, F.R.S. of Owen's College, Manchester, was recently delivered before the Iron and Steel Institute. HENRY BESSEMER, Esq., President of the Institute, occupying the chair.

The lecturer prefaced his remarks by a copious explanation of the principles of spectrum analysis. Before such an audience as he then had the honor of addressing, he would not enter into details with reference to the Bessemer process, or extol, as he might otherwise do, the genius and persevering energy of the discoverer of the process. They would, however, all agree, that whether the process were regarded in an economical, a chemical, or a mechanical point of view, it was one which had not its equal, either in modern or ancient metallurgy, and that it had begun a new era in the manufacture of our most important metals, iron and steel. It was to the application of the scientific principles of spectrum analysis to this manufacture of steel by the Bessemer process, that he had to draw their attention. He would begin by pointing out shortly, the chief principles which regulated this most interesting branch of science, and afterwards showing how those principles affected the particular process under examination. In explaining the principles of the process, the lecturer referred to the discovery, by Sir ISAAC NEWTON, in the year 1675, that white light was a compound of colored light, and might be separated into its component rays by passage through a prism of glass. NEWTON allowed a ray of light, passing through a hole in a shutter, to pass through a prism, and then fall on a screen, and he found that the white sun light was split up into the many-colored band which we now knew so well as the solar spectrum; and he came to the conclusion that the light of the sun consisted of rays differently refrangible. NEWTON then performed the reverse operation by passing the sun-light through another prism placed in the same direction, and thus bringing the colored rays again to a focus, and reproducing white light. The German physicist, KIRCHHOFF, had laid the foundation of the science of spectrum analysis, and in his observations had used four prisms, and instead of looking at the light with the naked eye, as NEWTON did, he viewed it through a telescope. KIRCHHOFF, and before him, FRAUNHOFER, WOLLASTON, and many others, instead of using a round beam of light, employed a narrow line of light, obtained through a narrow slit, and from this narrow line produced a spectrum, by resolving the light by means of a prism into its differently colored rays, beginning with red and ending with violet. When sun-light was examined, it was found to possess certain characters which were not present in the light of the carbon points. There were present in the solar spectrum certain dark lines, which had received the names of FRAUNHOFER's lines, because they were first properly mapped by the German optician of that name.

In consequence of a discovery by KIRCHHOFF, about ten years ago, those lines had assumed a very great amount of interest, inasmuch as they had been the means of revealing to a great extent the composition of the solar atmosphere. The dark lines in the solar spectrum were found by KIRCHHOFF to coincide with certain bright lines produced by the metals when their light was examined by means of a prism. The different portions of the solar spectrum or colored bands of light possessed very different properties. The heat-giving rays were situated almost entirely at the red end, and even beyond the red end of the visible spectrum. The luminous effect was produced by the more central rays, and the heating rays gradually diminished in that direction until they were almost unappreciable at the blue end. As we passed from the red rays to the orange and green and blue, we found that the spectrum began to assume a different character, and was capable of producing different kinds of action and doing different kinds of work. The blue rays were capable of producing chemical action. That fact had been known for many years, and hence it had been customary to divide rays of light into heating and luminous and chemically active rays, and at one time it was believed that it was possible to separate entirely the heating rays from the light-giving rays, and the light-giving rays from the chemically active rays; but such really was not the case. They simply differed in wave lengths, and in power of refrangibility. But, although it was not possible to separate them, it could be shown that the maximum of heating effect was at the red end. [This fact was shown by means of Dr. TYNDAL's apparatus, called the ray filter, and a piece of black paper and a portion of gunpowder were ignited in the focus of the dark ray. An experiment was then performed to show that the maximum chemical effect was produced by the blue end of the spectrum, a bulb filled with a mixture of chlorine and hydrogen gasses being exploded by exposure to blue light, after having been exposed to other colors without effect.] The spectrum, consisting of a continuous bright band of colors, was produced by a white-hot incandescent solid substance, as was shown by the spectrum of the electric lamp. Glowing solids and glowing liquids all gave off a continuous spectrum, whilst glowing gases gave off a discontinuous spectrum. Glowing gases had the power of what might be termed selective radiation: they had the power of giving off a certain kind of light. When the newly-discovered metal thallium was placed on the carbon poles of the electric light, it would be observed that a very brilliant arc of ignited thallium vapor was produced. This arc consisted of a stream of green light, due to incandescent thallium in the form of gas. If this green light were examined by means of a prism, it would afford a spectrum of a totally different character from that of the glowing solid carbon pole. The spectrum in the case of thallium consisted of a green band, nothing else being visible. The whole process of spectrum analysis depended upon the fact that glowing gas had the power of giving off only certain kinds of light, and not producing a continuous spectrum. The spectrum of copper, produced in the same way as that of thallium, consisted of green lines and of violet lines, which were less distinct, though not less characteristic of the metal. [The spectra of various metals were thrown upon the screen, and seen to consist of characteristic bright lines.] It could readily be imagined what a wide field spectrum analysis covered, inasmuch as if the spectrum of the light of any distant star were observed, it could be inferred with certainty that those lines were due to the vapor of the metal which produced the same lines in our experiments. The delicacy of the reaction was almost beyond belief. We could detect the 180,000,000th of a grain of soda, 6,000,000th of a grain of lithium. Lithium was formerly supposed to be very rare, but, by means of this process, it had been found to be almost everywhere. Spectrum analysis had led to the discovery of no fewer than four elementary bodies, namely, rubidium and cæsium, the new alkaline metals discovered by BUNSEN; thallium, which was discovered by Mr. CROOKES; and indium, which was discovered by Professor RICHTER of Freiberg. The spectrum might be obtained from the alkaline salts, or the alkaline earths, as well as from the uncombined alkaline metals.

The electric spark was, however, the especial means by which investigations on this subject could be made. When the spectra of substances were produced by the electric spark, and examined by the spectroscope, many hundreds of lines were observed, and it became possible to map out the lines of the different metals with great accuracy. To do this was KIRCHHOFF's great business. He mapped out the dark lines in the solar spectrum, and the bright lines produced by the metals with which he experimented, and he found that several hundreds of the solar lines coincided with the bright metal lines. The spectra of bodies which were gaseous at the ordinary temperature might be examined by the use of the electric spark, the gasses being inclosed in glass tubes, and the electric spark passed through them. [To illustrate this point, electric sparks were passed through tubes containing minute quantities of hydrogen, carbonic acid, nitrogen, chlorine, and iron. The lecturer, after further experiments, proceeded to deal with the application of spectrum analysis to the examination of the Bessemer flame.] He had already said that he should not feel justified in entering into a detailed statement of the chemical reactions in the Bessemer process. One good reason was, that there were many present who knew much more about it than he did himself, and another reason was, that he believed that even those who knew most about it knew very little. (Laughter.) They might take it that the first change that occurred was, that the silicon and carbon which were contained in the iron were oxidised, the graphite being converted into combined carbon. In the second stage of the process the carbon had diminished somewhat, but not in such a large proportion as the silicon. The carbon then gradually decreased until, at the last portion of the process, though it was not altogether gone, there was only about 1-10th or 2-10ths of it left, and the silicon had then diminished down to something like either a trace or only to 1-100th per cent. They all knew that the manganese played a most important part in the process, but the ores of iron used for the Bessemer process in this country differed widely in their amount of manganese from the ores used in Styria. This remark applies to the Atlas Works at Sheffield and the Dowlais Ironworks. Therefore, it must not be expected that in this country the manganese would play a very important part in the spectrum. With regard to the sulphur and phosphorus, he had little to say. The sulphur apparently diminished somewhat during the process, or, perhaps, altogether disappeared, while the phosphorus was scarcely got rid of at all. The reasons for this he would not attempt to explain, but there were reasons why they should not expect to see in the flame the re-action either of silicon, of phosphorus, or of sulphur. It was well known to all present that it was very necessary to stop the blast at the exact moment that the carbon had burnt out. The mode of ascertaining this point was by the dropping of the flame. It had struck many people that this point might be ascertained with greater accuracy if, instead of looking at the flame as a whole, they looked at its component parts by means of a prism. The Bessemer process might be divided into four stages. In the first stage the flame gave a continuous spectrum. At a certain period, which varied with circumstances, lines began to make their appearance. The first to appear were the yellow line of sodium, the red line of lithium, and the bright violet line of potasium. Farther on in the process a change came over the whole spectrum. Lines began to make their appearance in every portion of it, and, at last, there was a most complicated series of interspaced bright and dark bands. At a certain period of the blow these lines again disappeared, and at the last stage of the operation the second spectrum was repeated. This was the point at which the flame dropped, and at which it had been found necessary, by practice, to turn off the blow. Now arose the question of what the lines were caused by. Here, of course, we must enter, to a certain extent, into the field of conjecture. The subject was difficult, and the spectrum was complicated. He believed that there was no doubt that the bright lines were due mainly to carbon in some form. It was an interesting fact that the spectra of carbon, nitrogen, and similar bodies varied under different circumstances. Nitrogen could be made to exhibit two distinct spectra.

The same was true with regard to the spectrum of calcium, as seen in the Bunsen gas flame. This could be explained, for we know that, at the low temperature of the Bunsen gas flame the calcium compounds were not decomposed, and the spectrum was probably in reality that of a compound, such as calcium chloride, or calcium oxide; whereas, when the compound was heated more intensely, as in the electric spark, it was decomposed, and the true spectrum of the metal was obtained. The variation of the spectrum of nitrogen could not be so well understood. The carbon spectrum, when got from olefiant gas burning in oxygen, contained bright bands. This was different from that produced by the electric spark passing through carbonic acid in Geissler's tubes. The lines in the Bessemer flame were not identical in position with the lines which we could get from carbon; but seeing that carbon was capable of giving three different spectra, there was little doubt that the Bessemer flame spectrum was another modification of the carbon spectrum. It had not been found possible to produce the Bessemer flame artificially. It was generally emitted when the spiegel iron was allowed to run in. It was to be seen also in a hot blast furnace. Dr. WATTS, who had devoted some care to the subject, had found that the Bessemer spectrum was always observable when the hot blast was turned down to the bottom of the furnace, and in certain other cases where a high temperature was brought to bear upon carbon. But little was known as to the chemistry of the Bessemer process, and further experiments were needed. Such experiments, however, were matters of great difficulty. The lines of the Bessemer flame spectrum had been very confidently stated to be due to manganese. He (the lecturer), however, saw no reason for this statement. In such works as the Barrow Steel Works, where they employed an iron which scarcely contained any manganese at all, the lines were just as bright as in those places where a more manganiferous iron ore was made use of; and the lines in question disappeared as the carbon disappeared. With regard to the practical application of the spectroscope to the Bessemer process, the first question which arose was, whether the lines disappeared at the point at which the blow was turned off. He thought the whole evidence was unanimous in showing that they disappeared at the point at which it had been found necessary by experience to turn off the blow. The next question was, could this point of decarbonization be more accurately determined by the disappearance of the lines

than by the unassisted eye? and the third question which we might ask was, could we by any application of the spectroscope, in observing the appearance or disappearance of the lines, determine the point when the blow ought to be stopped, so as to leave in the steel the requisite quantity of carbon? Whether the adoption of the spectroscope became general depended upon how far, in the future, it was found necessary to prepare steel of the same degree of tensile strength, and containing as nearly as possible the same percentage of carbon. There was no doubt that variations in the percentage of carbon must occur, even were it possible to hit the point of decarbonization. As a general rule, a better steel was produced when the charges were kept uniform in working with the unaided eye. But, even under the most favorable conditions of uniform charges, exceptional and difficult blows would occur. There were great inequalities in the blows needed for decarbonization, both as regarded temperature and duration. It was generally said by the workmen that no two blows were exactly alike. It must be admitted that we were only in the infancy of the steel manufacture. If it became necessary in the future to make a steel in which the amount of carbon did not vary beyond 1-10th of 1 per cent., they would be obliged to use the spectroscope. In certain cases, the spectroscope had already proved itself of inestimable value in new works, and in works where different ores were needed to be used. It had been most successfully employed, especially on the Continent. From information which he had just received from Gratz, he learnt that the spectroscope was largely used in Styria, Saxony, and Belgium, and at one place it appeared to be impossible to produce uniform steel until spectrum was introduced, in 1869, and from that time the steel had not varied more than 1-5th of one per cent. in carbon. In England, the difficulties were somewhat different. Here there was probably used a more uniform ore than the highly manganesed ores of the Continent, and hence, the spectroscope might be less useful here than on the Continent. At any rate, it had not been so largely adopted here as abroad, and the reason was that no advantage had been seen in the employment of a more delicate test than the unaided eye of the workman.

As to the third question, whether it was possible, by means of spectrum analysis, to stop the blow at the right point, he was glad to be able to give some information of interest, and, he believed, of importance, which had just been placed in his hands by a gentleman whose name they were all well acquainted with, and whom he was proud to be able to number amongst his pupils. That gentleman was Mr. Snellus; and there was no doubt that they would hear a great deal more of him before long. He had put into his (Dr. Roscoe's) hands the results of a series of experiments which proved what appeared to be a very important point, and that was, that not only could he find the point of decarbonization more accurately by means of a spectroscope, but he found it possible, during the course of the blow, to predict how long the blow would be. For instance, in the middle of the blow he could predict that the blow would last, say eighteen minutes, and he had found that it had actually lasted that time. Twenty experiments of this sort had been made at Dowlais and Abervale, and the length of the blow had been predicted with certainty. They would all of them at once see the importance of this observation, because if it enabled the operator to tell at what point the blow would cease, it would also enable him to stop three or four minutes before the time, and it only remained, therefore, to know whether the steel, after having been partially blown, as was the case in Sweden, was in a fit state to be used, and whether the last two or three minutes of the blow did not, in some way or other, alter the quality of the steel, besides getting rid of the carbon. If, for instance, in the last portions of the blow a large quantity of silicon was got rid of, supposing the blow were stopped three minutes before its natural end, there would be produced a steel containing large quantities of silicon. These results were quite new, and of course they would have to be worked out, but Mr. SNELLUS might be congratulated on his very interesting observations. He (the lecturer) had that day received a note from a Mr. BRAGG, of the Atlas Works, in which the writer stated that they daily used the spectroscope at those works in determining the point of disappearance of the carbon, and they were, to a certain extent, satisfied with the result. Some persons were very anxious that the spectroscope should do everything, or, at any rate, more than turned out to be possible, and they, perhaps, would say, "We are very much obliged to you for coming here, and telling us how to find the point of decarbonization, but we can do that for ourselves very well, but we shall be very much obliged if you can tell us about the phosphorus and about the silicon." He (the lecturer) would be very glad to do so if he could. (Laughter.) He would, however, endeavor to give his reasons why he believed it was not possible to deal with the phosphorus and silicon by means of the spectroscope. From what he had said, they would observe that it was necessary that the substance should be present in the state of glowing gas. If it was present in the form of a liquid or a solid, it would not give any distinct spectrum. As to silicon, it was excessively difficult to get it into the state of gas, and all attempts at determining its spectrum had been in vain. The moment silicon boiled it formed the white oxide called silica, and this white oxide, though it might be noted by the heat of the oxy-hydrogen flame, could not be volatilized; and this, in his opinion, was the reason why, at the commencement of the blow, there was a continuous spectrum, and why, during the whole of the blow, there was a more or less continuous one. With regard to phosphorus, it was quite true that its spectrum could be obtained. That spectrum consisted of three bright green lines. He believed that the reason why the spectrum of phosphorps was not visible in the Bessemer flame was a very good one, namely, that there was scarcely any phosphorus present. Although the spectroscope could tell nothing about phosphorus, he had no doubt that it would, in time, come to be much more largely employed than at present, and that it would be able to indicate, as was originally to be hoped, when to finish the blow. The lecturer concluded by stating that, through the want of time, he should be compelled to omit a portion of the remarks he had intended to make.

The President briefly expressed the thanks of the meeting to Dr. ROSCOE, for the lecture he had just delivered. The discourse was one full of interest, and if at the present moment the application of this new branch of science had not led to all the results which had been hoped for, at least it had shown some facts to which they might hope other facts would be added, so that the process might eventually become of great value in the hands of the manufacturer. In the early stages of an instrument so novel as the spectroscope, it was impossible to judge what the ultimate result would be; but when it was found that useful results had been obtained by it by Mr. BRAGG, and also on the continent, and when they reflected how early in the days of its discovery they still were, they might look forward with confidence to the time when the investigations would be carried into their ordinary daily operations. He (the President) was sure they must have been gratified with the numerous illustrations they had witnessed. Looking at the upturned faces of the audience spectroscopically, he saw in those visages no black lines indicating a want of appreciation of the lecture, but only bright bands, which evinced to him that the intellect had been touched, and that they all recognized in the lecture they had heard one of extreme interest, for which they ought to thank the lecturer. He was sure they would join him in thanking him most cordially for the way in which he had given them an intellectual treat, and, he hoped, laid the foundation of something that would be more substantial even than what was yet attained.

The Present Condition of the Iron Industry.

THE following is the conclusion of the address recently delivered by Mr. HENRY BESSEMER before the Iron and Steel Institute of Great Britain: Among the various improvements that have within the last few years been introduced in the manufacture of iron, few are of such magnitude and importance as the production of armor plates, a manufacture called into existence by the advances made in modern artillery. The rapidity with which manufacturers have responded to the call thus made on their skill and enterprise, affords an excellent example illustrative of the way in which the engineering talent of this country seems capable of keeping pace with the ever increasing wants both of the arts of peace and of war. The production of malleable iron, of the excellent quality with which these plates are made, also affords another proof of the rapid progress made in this department of our great staple manufacture. In the early part of these remarks I proposed, with your permission, to touch on one or two subjects, which it appears to me are matters of great importance, not only to the members of the Iron and Steel Institute, but to the whole engineering profession, as well as to the public in general; and when I reflect on the thoroughly practical character of the many eminent manufacturers and engineers whom I have now the honor to address, the conviction forces itself upon me most strongly, that such an organization as ours is one eminently calculated to solve many of the important practical questions, both in connection with the manufacture of iron and steel, and their employment for constructive purposes, which individuals, unaided and alone, might well shrink from grappling with. It is from the members of the Iron and Steel Institute that the world look for a practical definition of the terms *Iron* and *Steel*. It is true that, from a chemical point of view, the line of demarcation which separates these substances is as little marked as the rainbow's hues, which melt imperceptibly into each other, leaving no part at which it may be said here one ceases, and there the other begins. Thus it is with iron and steel, which pass by almost imperceptible gradations from gray iron, through every stage of mottled and white to hard steel, and from it to steel in its mildest form, which passes into malleable iron almost unmarked. Although admitting the truth of this view of the subject, when considered chemically, the practical man recognizes in the metal iron a substance which, in its more or less pure or alloyed state, and under its physical conditions of cast or wrought iron, possesses properties so different and so anomalous that its classification becomes both easy and natural, hence three primary divisions have everywhere been recognized, viz., cast iron, wrought iron and steel; and allowing a certain latitude in each class there seems no reason to dispute the propriety of such definition.

With regard to the two former, cast iron and wrought iron, their manufacture has been pursued so long in every civilized country that their nature and physical characters are well known and universally recognized; but, with reference to steel, this can scarcely be said. In the latter part of the last century the ingenious clockmaker, HUNTSMAN, found that steel made by the cementation of iron bars was rarely perfect enough in its structure to yield a clock-spring of equal strength throughout. Unable to obtain a sufficiently reliable material, he hit upon the happy idea that the fusion of bar steel, if practicable, would furnish a far more reliable material, perfectly homogeneous in structure, and free from the numerous flaws which the accidental envelopment of wood ashes on the Swedish bar so frequently caused. Fortunately for mankind, this bright idea was brought to the test of practical experiment; and, after numerous failures of every kind, HUNTSMAN was at last enabled to construct furnaces that would furnish the necessary high temperature, and crucibles that were not destroyed at a single heat. He thus at last succeeded, by laborious efforts, in producing cast steel—the most valuable and perfect condition in which the metal iron is known. This valuable process was unprotected by patent, and was kept a profound secret by HUNTSMAN for many years. The way in which it at last became known is among the historical events of the past, that are better buried in oblivion. At this period there was but little prospect of the extension of the use of cast steel to other than very exceptional purposes. Being made in crucibles, containing only from 5lbs. to 7lbs., its cost was very high, while the difficulty of fusion at that time prevented any but extremely hard or highly-carbonized steel from being made. The manufacturers of Sheffield have, however, gradually overcome these difficulties, and in the year 1851 the production of cast steel in Great Britain had risen to 1,000 tons per week; and at that time a plain square bar of 500lbs. in weight could probably have been purchased at as low a price as £40 per ton! The great extension of the cast steel manufacture within the last few years, its reduced cost of production, together with the facility now possessed of making it of a mild or tough quality, has brought it into competition with wrought iron for several most important uses in the arts. It is this fact which opens up the important field of inquiry to which I desire especially to direct your attention. So recent has been the application of mild cast steel to engineering structures, that the civil engineer finds himself at a loss to estimate its value as a constructive material, and its applicability to the work he may have in hand. If he desires to use wrought iron, he has a thousand examples before him. He has printed tables and formulæ almost in every book he turns over, and in all this he is confirmed by numerous examples, and by his own practice and observation; but, if he desires to employ steel for any new structure, be it the roof of some large building, a span of unusual length across a river, where intermediate piers are almost impracticable, or in any other case, in which he hopes by economy of weight he may obtain that in steel which he cannot hope to accomplish with a weaker material, where, under such circumstances, is he to look for the desired information? Where are the numerous tables he is wont to employ? Where the formulæ deduced from practice to aid his calculation? Where the example from which he can draw his own conclusions? It is to fill up this void, and to supply such information on the authority of the first practical men in this country that I propose to establish proofs so well authenticated and irrefragable as to form a sure basis for after calculation, and afford means of estimating the strength of structures, and to supply tables in which implicit reliance can be placed.

The great point, I take it, will be to make such tests comparative with iron in all cases, and under circumstances equally well adapted to show the comparative value of each material for structural purposes. This is the more necessary, because I believe that many of the tables and formulæ at present in use were made at a time when wrought iron had not arrived at so perfect a state of manufacture as that to which it has now attained. It would be, therefore, necessary to repeat every test in the wrought iron and steel of the present period, in order to ascertain with precision their relative powers of resistance, under identical conditions, or under such special conditions as may be more favorable to either material. Should it be thought desirable that the Iron and Steel Institute should investigate this subject, I would propose that a series of preliminary experiments should be made, showing the resistance of the different materials, both to tensile and compressive force, as well as to violent concussions and long continuous strains, all of which facts could be furnished by the powerful machinery erected for this and similar purposes by Mr. DAVID KIRKALDY, whose high position would be a sufficient guarantee of the correctness and perfect impartiality of any such report. I speak of these as preliminary tests only, because I think the members of this Institute will agree with me that it is not the simple breaking or twisting of a single bar, free at all parts except in one particular direction, that is wanted; but it is the more complex strains that we have to encounter in practice, that it is desirable to ascertain and to record. Thus it would be necessary to make several beams and girders of such form and construction as will fairly represent the uses to which iron and steel are applied in practice. It is in order to construct these test girders of proper proportions that I propose to make the first or preliminary experiments on the materials of which they are constructed, and I would further propose that any errors arising from the imperfect apportioning of strength in the different parts of these girders should be corrected by reconstructing them after their weak places have been shown by a first trial, and thus arrive at a structure, as near as may be, equally strong at all points, and showing the exact amount of material necessary to withstand the tension and compression of the several parts of the structure. I will not trouble you just now with the details of the simple mode by which I propose to test these beams and girders; but I have little doubt but that they would be most satisfactorily carried out by Mr. KIRKALDY, so as to complete the whole series of tests in the most reliable form.

Before quitting this subject, I wish to draw your attention, briefly, to the special modes of construction to which I have before alluded, and which become necessary, because wrought iron and steel differ so much in the conditions of their manufacture as to render forms and sizes in one material easy and inexpensive, which would be almost impossible, or, at least, too costly in the other. For example, in a large plate girder the upper and lower webs are usually composed of numerous pieces of plate iron, rivetted together in several thicknesses, entailing the labor of punching numerous holes, the employment of many rivets, and much labor of fitting together, and, in the end, accompanied by a considerable reduction in strength, as compared with a solid slab of the same metal. It will at once be obvious that in the manufacture of cast steel great facility is afforded in making large masses, as compared with the production of such masses of wrought iron. Thus, where steel is employed for the top or bottom web of a large girder, it is evident that the simplest way would be to roll a

single slab of the desired dimensions, thus avoiding the labor of cutting plates to size and punching and rivetting them, and thus, also, avoiding the great loss of strength consequent on the loss of section at the rivet holes. It would, therefore, appear that on any comparison of the two materials, for a given structure, the facility which steel affords of supplying large masses must be taken into account. Nor is this all, for steel may be made with equal facility, either hard or soft; and in the upper web of a girder, steel, specially adapted to bear a high compressive strain, may be most advantageously used. A single glance at one of Hodgkinson's cast-iron girders shows, at once, how small a top web is necessary in a material so difficult of compression as cast iron, while its weakness under a tensible strain is, in like manner, exhibited by the massive proportions of the lower web. Although the difference in the two qualities of steel will not show so great a difference in the proportions of a steel girder as we see in the cast iron one, it would, I believe, be of sufficient magnitude to considerably alter both the weight and cost of the structure. This harder material might be used in all cases where compressive strain alone is used; and, in order not to complicate the manufacture by numerous qualities of steel, one special quality might be fixed on for this purpose, and be distinguished from the usual make, as *steel for compression*. It would be no less interesting to ascertain how far the properties of wrought iron and steel, combined in one structure, could be advantageously employed with the view of affording, with a given weight, or at a given cost, the greatest amount of stability in structures of this kind. I have hitherto spoken only of beams or girders as affording examples of the nature of the tests which I deem desirable; but it will be obvious that these researches could be so modified and conducted as to afford correct data to the shipbuilder as well as to the engineer. Indeed, I believe that steel has already been somewhat largely employed, in combination with iron, for shipbuilding, by the late chief constructor of the navy, with the intention of developing a greater amount of strength with a given weight of materials. I believe it will be found that the rate of expansion of iron and steel within the limits of atmospheric temperatures will oppose no practical obstacle to their combined use. The advantages to the manufacturers which would result from an exhaustive series of trials on a practical scale, such as I propose, would be further enhanced by the readiness with which the Board of Trade and other public bodies would thereby be induced to approve structures of steel, or steel combined with iron, the weight and dimensions of which are subject to their approval. Before closing these remarks, there is another subject which I desire to bring under your notice, because it is one on the merits and importance of which you are so well able to decide. The great development of the mechanical arts within the last century has rendered it extremely desirable that certain uniform standards of size, or measure, should be set up, by means of which a uniformity of practice has in many cases resulted. Thus, we owe to Sir Joseph Whitworth a series of standard gauges, which have been universally adopted in engineering establishments, to the great advantage of the manufacturer and user of the machinery in which these accurate and definite sizes of parts have been introduced. The same may be said of the Whitworth screw threads so generally employed in our mechanical workshops. But perhaps the most marked application of the employment of standard screw threads is found in the manufacture of welded iron gas pipes, from which we derive an amount of advantage, which, owing to our familiarity with it, is rarely appreciated to its full extent. So obviously advantageous is this system, that we happily see its principle extending from day to day, even to an entire mechanical structure, as in gunmaking, where every part is made to a standard pattern, so that the possession of a few duplicate parts will enable a broken or otherwise useless rifle to be restored in a few minutes, at a cost immeasurably below that which would have been required to make a single part to order. And it must be borne in mind that this system of standard sizes not only affords great advantages to the general public, but it lessens the cost of production, by admitting of the employment of special tools and appliances for the production of these numerous pieces, which could not be employed in the chaotic state reigning in our manufactories before these principles were applied. In the early days of our railway system, the great STEPHENSON and his compeers had to feel their way gently in the new career they were pursuing; their engines were mere toys compared with those we now employ, and the loads they drew were small in proportion. It was, therefore, only necessary that they should employ a rail suitable to the traffic of the lines as then worked; but as the railway system began to develop itself, and new lines were opened, the necessity for heavier engines and greater traffic became apparent to the engineers by whom they were designed. Nor was the mere addition of size the only point studied; different modes of laying down the rail were proposed and were canvassed with great interest. Stone blocks gave way to cross wood sleepers, and these again had their rivals in longitudinal sleepers, and with them came the bridge rail and the Vignoles rail, and the double-headed rail now commonly in use. Nothing could be more natural than the way in which the profession thus glided imperceptibly into the adoption of rails, of almost every imaginable variety of form and size, nor can any one be blamed for a result almost inevitable under the circumstances. But it is now evident that there is no need in practice for this infinite variety of size and form; we know very accurately what is the general average traffic on a line and the weight of our engines.

The work which a rail has to perform is so perfectly simple, and so clearly defined, that there cannot at the present day be any difficulty in establishing a standard rail suitable for all purposes. Thus, suppose we take the double-headed and the Vignoles rail as representing the two classes of rails suitable for longitudinal cross sleepers, and if we make a heavy medium, and light one, of each of these types of rail, we should have a choice of six sizes, that would supply all the reasonable demands of our present railway system. Taking these three standard sizes of iron rails, of each class, I would then make three other standards of steel rails, in which the table or wearing surface was identical in each case with the iron standard, but so reduced in power per yard as to reduce its power to resist a blow or to sustain a weight precisely equal to the iron standard, so that in all cases the iron *a b c* rails and the steel *a b c* should possess the same powers of resistance to a heavy load or a sudden concussion. We should thus diminish the great apparent difference in price between the iron and steel rail, for it must be remembered *that the price per mile, and not the price per ton*, is the real test of the *cost of rails*. The adoption of a standard rail would afford great facilities to the manufacturer by diminishing his stock of *rolls* and allowing him to manufacture in slack times, and to supply any sudden demands from stock. It would lessen the cost of production and afford the general advantages to the consumer and producer which have hitherto resulted in all cases from the adoption of universal or standard measures. It is difficult to imagine the state of utter confusion that would have reigned throughout our whole railway system had the gauge differed on every line to the same extent as the rails. The one instance afforded by the broad gauge is sufficient to convince us of the immense disadvantages that would have resulted from such an error, and I doubt not but, should we happily arrive at a universal *a b c* standard for rails, we should in the future look back with dismay on our present chaotic state. I, therefore, feel a conviction that the time has arrived when a conference with our leading railway engineers would result in the adoption of an iron and steel *a b c* standard for rails, to the great advantage of all concerned. There would, of course, be no difficulty in supplying, if required, *outside sizes* at a *higher quotation*. In the course of these remarks, I have ventured to bring under your notice two proposals, which appear to me deserving of the attention of the Institute, and which are intimately connected with the interests of many of its members. I have done so with much diffidence, because I cannot but be aware that I am addressing many gentlemen who are far more able than myself to form a correct opinion on the subjects I have been discussing. I must, therefore, beg that you will clearly understand that I have no wish to put forward these propositions with any force as coming from the chair. Indeed, I do not know that such subjects should have been broached at all in an address like the present. I feel, also, that I owe you some apology for dwelling at such length on the subject of steel, but I have felt it almost impossible to avoid doing so.

Railroad Records.

THE destruction of buildings and their contents—relics of antiquity, or records of modern knowledge, or the accmmulated materials out of which knowledge is to come through the studies of future men—by war, in Europe, impresses both the historian and the scholar painfully. It has occurred in all ages. It happens still; and often on a grand scale, as in the recent ruin of the libraries and museums of Strasbourg.

The war of 1861–5 was characterized by one of the most extensive and completest devastations of this sort. Very few public buildings and private mansions in the Southern States escaped sacking. Scarcely a State paper, rare book, or railway survey, is now to be found in its proper place. Whole libraries, like that of Chief Justice Marshall, were heaped upon the floor, the volumes cut through the back, the pictures torn out, and the fragments used to light camp fires. Entire State records were scattered or destroyed. The invaluable series of State Survey of old Virginia has disappeared. All the early maps of the land office at Richmond are gone; and Richmond is but one of many other points of collection which became suddenly points of irretrievable dispersion of materials for history, and legal decision, unique in themselves, and of priceless value for future generations.

In no department has the loss of documentary evidence of past work done, amounted to such a figure as in the department of railroad construction. Scarcely a single railway company of the South preserved a preliminary survey of its route, or even a profile of its actual grades. We have tried in vain to obtain authentic information even of the terminal elevations above tide. The approach of a Northern or of a Southern army corps was equally dreaded. Files of papers, map rolls, profiles, account books, were hurriedly tumbled into such bags and boxes as were at hand, and secreted in private houses, which were in their turn ransacked by the soldiers, and the deposits scattered or burned.

The same fate befell the manuscript survey maps and descriptions of mining and manufacturing companies; and seldom now can any private or official collections of this kind be found complete. Most of the company organizations went to sleep, or into bankruptcy, or into other hands, or were operated through the military orders of Confederate officers.

It is quite true that in times of peace, the loss of records, sometimes of the rarest kind and highest value, is continually taking place, from the offices of the best established corporations in the Northern States. As an instance, we may mention the disappearance of the elaborate topographical survey maps of Fayette, Cambria and Westmoreland, in Western Pennsylvania, on which several years of instrumental and geological work was bestowed, about fifteen years ago. No clue to their whereabouts can now be obtained. Whether they are lying in their tin case in some overlooked corner of the offices in Philadelphia, or whether they are carefully concealed in some private person's bureau drawer in the country, is a question which, even if it could be answered, might not bring them to light. But the retention of such maps by any private individual is so reprehensible, that we must believe the loss to be accidental, and the restoration only a matter of time.

Thousands of such instances might be cited. Such losses occur in Europe as well as in America. Yet nothing strikes a traveller more forcibly than in the care bestowed upon the treasures of museums, libraries and government bureaus abroad. In coming years no doubt the same carefulness will become habitual to officials in our country. But the small and regular salaries affixed to European functions, the economical and stationary habits of the people of the Old World, and the strict subordination and personal responsibility demanded of every employee of government under pain of the severest of all punishments, dismissal, operates as an effectual check upon disorder and peculation in the cabinets and libraries of museums and in the offices of railway and manufacturing companies.

On the other hand, the migratory habits of the Americans, the frequent change of employment, the facility with which young men climb into the most responsible positions, a certain national hatred of, and contempt for, what is nick-named by irresponsible people "red tape," the total absence of discipline, the impossibility of imposing any severe punishment for dereliction of duty, a country parted out under separate governments, yet allowing perfect freedom of translation from one place of business to another, and, as a consequence of all this, the lack of any well-established code of morals in the official and business world—to say nothing of the spiritual debauchment of the political world—renders insecure in any place of deposit any valuable record of the past history, any specimen of the present wealth of the nation, which may attract the fancy, or prove useful to the immediate pursuit of any individual citizen.

The opinion has been often expressed that Caliph Omar did the world a favor in heating the baths of Alexandria with the precious papyri of Psammaticus and the priceless parchments of the Ptolemies. We do not think that LAUTH and BRUGSCH and LEPSIUS, CHABAS, DE ROUGÉ and BIRCH, appreciate such opinions highly. Certainly a vast amount of trash was happily got rid of at Strasbourg; and a still larger amount would have relieved the world of its presence had the Prussians burnt Paris. But NEWTON is reported to have admired the quantity of dirt the Lord employs to make a planet, and the Bibliotheque Nationale may be pardoned its roomfuls of scholastic tomes for the sake of the care it takes of single specimens of the most valuable works of man. Not more than a thousandth part of the stuff so nicely laid away, sheet upon sheet, in the waters of the Coal Era is of the slightest mineralogal value; but without that thousandth part where would civilization have been now? A howling savage, a stupid peasant, or a ragged beggar, and no more. Without the nine hundred and ninety-nine parts of trash the indispensable thousandth part could not have been preserved.

Fire-proof buildings for museums, libraries and railway offices are as needful as fire-proofs for banks. And the same watchful oversight and record should be kept over all surveys and profiles of railroads, as over church registers of marriages, births and deaths. No one ever knows when or how the most trivial scrap of honest and intelligent labor may become important to the office. If lost, the work must be done again, often in a hurry, always with a certain uncertainty because out of its true relations to other and cotemporary work. In this country time is money, and the shortness of hands should be compensated for by length of head, care, order and discipline.

As to Railway Records, all our companies, Northern as well as Southern, will in course of time no doubt order re-surveys of their lines to recover the contents of their lost documents. But in the meantime much may be done by those who feel a scientific interest in or have business need of the data which have disappeared. We will give an illustration.

The other day we had occasion to look at the Orange and Alexandria Railroad, wanting to get a good idea of its profile of grades. We took notes with a particularly excellent aneroid barometer made for us by BECKER & SONS, of New York, some years ago, on a new plan; the circle having been divided into 4,000 parts, 2,000 to a mercurial inch, or rather to 1,000 feet of elevation; so that variations of height amounting to only 2½ feet can be easily read without a glass. The instrument has no backlash in its joints worth noticing, and is quick in answering to a reversal of grade. It is needless to say that the absolute elevations cannot be thus obtained from the window of an express train; because, even in a run of only five hours, the diurnal variation of the mercury will have its effect, and unless the day be very quiet, other meteorological changes may be superadded. But even these sources of error can be stopped by having a friend observe a stationary barometer at the same time. And if the day be fair, the errors can be practically annulled by adjusting the terminal points of the barometric set of observations, to the established sea levels of the termini of the road, and elevating or depressing all the levels noted, *pro rata*.

Merely as a useful amusement to young engineers we recommend this kind of barometric note work when they travel. After a little practice they will be able to add topographical notes of the district through which the road runs; and in the absence of a map of the road, they can make a rude one for themselves by observing the sun in connection with their watch.

We have always intended to publish in the *Register* records of the grades of the railways of the United States in some regular order. But on application to the superintendents of different roads we learned the fact of the wholesale destruction of such records, or their loss by carelessness. We have been forced, reluctantly enough, to abandon the idea for the present. But if any of our correspondents will send us records of grade and curve, or profiles and copies of maps, we

will not only publish them but guarantee them the thanks of the railway community.—*U. S. R. R. and Mining Register.*

Temperature of the Sun's Atmosphere and its Internal Molten Mass.

PROFESSOR ROSCOE stated in the address lately delivered before the British Association that, in the opinion of Zollner, the hydrogen which mainly composes the red flames that shoot forth with such extraordinary rapidity from the sun's surface, must have been confined under great pressure by a layer of liquid.

The difference of pressure required to produce an explosion sufficient to cause a prominence to rise 3.0 minutes, was calculated to be 4,070,000 atmospheres. This pressure is attained at a depth of 139 geographical miles under the sun's surface, or at that of 1-658th part of its semi-diameter. In order to produce this enormous pressure the difference in temperature between the enclosed hydrogen and that existing in the solar atmosphere amounts to 74,910° Cent. Zollner also calculates the approximate absolute temperature of the sun's atmosphere to be 27,700° Cent.—a temperature about eight times as high as the oxyhydrogen flame, and one in which iron must exist in a permanent gaseous form.

MINING SUMMARY.

Nevada.

MINERAL HILL.

A correspondent of the Elko *Independent*, writing from Mineral Hill, under date of April 2d, says: "There is not a camp in the State that can show a better shipment of bullion than Mineral Hill. In the month of March there were shipped, per WELLS, FARGO & Co., 79 bars of crude bullion, valued at $120,781, and this from one fifteen-stamp mill; and had we another mill, as we certainly ought to have, we could not be surpassed by the largest camp in the State."

MINING AT ELKO.

The furnace of E. V. ROBBINS, in this town, says the Elko *Independent*, April 8th, was put into operation again on last Wednesday morning. The workmen commenced feeding at 8 o'clock that morning, and yesterday noon 280 bars of bullion had been produced, averaging 110 pounds each. The ore that is being smelted at present is from Lucine, Utah, and from Railroad district, mixed together. The first twenty-four hours run from the furnace produced 127 bars of bullion, weighing seven tons. This is certainly an extraordinary production from a furnace but thirty inches in the clear on the inside, and eleven feet in height, and we understand that it is the largest run ever made by any similar furnace in the State. The bullion is worth $175 per ton.

COPE DISTRICT.

The following encouraging statement about Cope District, says the Elko *Independent*, is from the pen of a gentleman well posted in mining matters. He writes, under date of April 2d, as follows: "We are having very pleasant weather here, and the roads are drying fast. The camp looks better to-day than it ever has before. The Argenta Company is getting out splendid rock from its old tunnel; its new shaft is down and it has commenced running for the ledge at a depth of 250 feet; 30 feet in distance has been drifted from the shaft, and it is thought the ledge will be struck in 40 feet more.

The Independent is certainly the richest thing so far ever struck in the camp. I have a specimen of half a pound, all horn silver, no rock about it. I saw a specimen that weighed a pound and a half, all horn silver. The owners of one of the mills here offered $3,000 for a ton of this ore, which had been hauled to their mill. I know this is so, for I have it from one of the parties concerned. The Robert Emmet is turning out splendid ore. SAMUEL HENDY is taking out No. 1 ore from the Pride of the West. The El Dorado, owned by HAYS & NIVER, is a well-defined lode. Great Eastern, U. S. Grant, Idaho, and Nevada, are all turning out splendid rock. Mr. POOLE is chloriding near the Excelsior, and getting some of the richest float I have ever seen. We are all looking forward to the time when the Argenta people strike the ledge in their drift; if they should strike even $40 rock, it will be sure to give the camp new life. F."

WHITE PINE ITEMS.

From the White Pine *News*, of April 7th, we clip the following: The troublous times threatened on Treasure Hill appear to be drawing to a focus, and will probably end in bloodshed. The Richmond Company, having completed their preparations, have made everything ready to take possession of the ground claimed by them. The Eberhardt Company have fortified a house on the ground, barricaded with bags of earth, and convenient loop-holes to fire through when occasion demands, with a force of armed men to guard their interests. It is expected that decisive measures may be used by both parties at any hour.

A rich ledge of milling ore was discovered a few days since, near the top of White Pine Mountain, and is the first discovery on that mountain of free milling ore. All the mines heretofore discovered in the base metal range have carried a very large proportion of base; but this ore is entirely free from any base metal. Two men can, with ease, extract one ton of ore a day that will mill $300 per ton. The ledge, as far as opened, shows to be from twelve to twenty inches wide. There must be more free ledges where this ore came from; and as soon as the snow goes off White Pine Mountain will be covered with prospectors.

MINING AND STOCK MATTERS.

Owing to the continued good and promising appearance and consequent increased yield of our mines, says the Gold Hill *News*, April 15th, stocks are decidedly lively. They have been so for weeks past, and are liable to continue so for some time to come, judging from the present situation. The mines of the Comstock are yielding much better at present, and also being more economically and advantageously worked than in former years. The result is shown in the excellent and long-continued dividends to stockholders, and the prosperous condition of all the mines. This also seems to be a good time to levy assessments, for some pretty responsible ones have recently been levied. These assessments, however, are required in defraying the expense of new and important prospecting enterprises and contemplated improvements, heretofore deferred, and which are supposed to be productive of rich future results. From the very comprehensive tabular statement of statistics relative to the mines of this coast, recently published by RICHARD WHEELER, editor of the San Francisco *Stock Report*, a copy of which has been kindly furnished us by him, we extract the following items of interest, giving the number of feet and shares in each of our principal mines, also the amount of dividends and assessments on the same within the past ten years:

	Feet.	Shares.	Assm'ts.	Divi't's.
Gould & Curry	1,200	4,800	$561,600	$3,826,800
Savage	800	16,000	468,000	4,288,000
Chollar-Potosi	2,800	28,000	462,000	2,212,000
Hale & Norcross	400	8,000	610,000	1,518,000
Ophir	1,400	16,800	1,064,000	1,394,400
Kentuck	95	2,000	70,000	1,252,000
Imperial	164	4,000	450,000	1,067,500
Yellow Jacket	1,200	24,000	1,518,000	1,834,000
Crown Point	600	12,000	623,370	855,000
Empire Hill	75	1,200	90,000	513,600
Gold Hill Quartz	13½	500	35,000	41,250
Confidence	130	1,500	218,880	78,000
Daney	2,000	8,000	436,000	56,000
Occidental	——	10,000	165,000	20,000
Sierra Nevada	——	20,000	450,000	102,500
Alpha Con	300	6,000	132,000	——
American	2,000	13,600	52,200	——
Belcher	1,040	10,400	192,400	——
Bullion	2,500	5,000	1,077,500	——
Con. Virginia	1,160	11,600	127,600	——
Exchequer	400	8,000	128,000	——
Flowery	3,600	12,000	12,000	——
Julia	2,000	10,000	106,200	——
Overman	1,200	12,800	632,688	——
Segregated Belcher	160	6,400	180,800	——
			$9,836,038	$19,112,050

This statement being published April 8th, does not, of course, include the dividends since paid on the Chollar-Potosi, amounting to $280,000; Hale & Norcross, $40,000; Yellow Jacket, $50,000. The statement is not only interesting, but the showing is a good one, and will be still better during the next twelve months. We have no new discoveries of ore to mention this week, but the Crown Point and Yellow Jacket mines are giving an increased yield from the excellent bodies of ore already developed, and the Kentuck is also yielding well and getting into good working trim once more. The Overman yields about 75 tons per day, the Chollar-Potosi 300, the Hale & Norcross 200, and the Savage 130. The March receipts of the Crown Point mine were $71,741, Chollar-Potosi $301,722, Savage $68,500, and the Gould & Curry $17,932. This last mentioned mine is not yielding much ore at present, and only from the old upper workings of the mine. New foundations for the hoisting reels are just completed, and the shaft is about to be re-timbered a distance of 400 feet, where it is in bad condition, for the purpose of further prospecting at the lower levels.

Colorado.

THE BULLION PRODUCT.

The Colorado *Miner* says: During the year 1868 Clear Creek county shipped $91,820 35, coin, in bullion; in 1869 we shipped $400,354 00, coin, and in 1870 we added $481,354 08, coin, to the supply of bullion of the world. From present indications we anticipate that the shipments for the year 1871 will be over $750,000 in coin, with a strong probability of amounting to over one million dollars.

CONSOLIDATION.

The same paper is informed that a consolidation of interests has been effected between the Marshall tunnel and the various mines in that vicinity, and that all litigation and dispute betwen the owners of the celebrated Equator lode and the Marshall Company ceases, the consolidation referred to having placed under one management two thousand four hundred feet of the great Equator vein, together with numerous other valuable silver lodes, already cut or to be cut by the Marshall tunnel. The Marshall S. M. Company have also purchased the west half of the great O. K. lode, which is now one of the richest lodes being worked in Colorado. The first-class ore from the vein yielding over $1,300 per ton. The Marshall tunnel will cut this lode at a distance of about 1,250 feet from the mouth of the tunnel and at a depth of 600 feet from the surface. The Marshall tunnel is now over 1,000 feet in length, and has cut seven true fissure veins, carrying silver ores. The veins are large and well defined, and in every instance have perfect walls, and vary in width from six to fifty-two feet. The Marshall tunnel is to be driven the entire distance through Leavenworth mountain, 3,912 feet, obtaining the depth, at the apex of the mountain, of 1,056 feet. The tunnel must necessarily cut over fifty silver lodes in passing through the mountains, varying in depth from 150 to 1,050 feet. The Tunnel Company have taken the precaution to secure the ownership of all the lodes discovered in the line of their tunnel, and have the right to pre-empt the west extensions of all lodes discovered over eight hundred feet to the east of the line of the tunnel. Consequently the tunnel will own by discovery all the extensions of that rich belt of lodes on the Leavenworth mountain comprising, among others, the Tom Thumb, Argentine, George Law, Great Eastern, Rocky Mountain, Indigo and Gilpin. The Tunnel Company have a good water power at the mouth of the tunnel, and the amount of timber surrounding the tunnel and mill site is simply enormous. We shall now expect the Marshall Tunnel Company to be a steady and large producer of rich ore.

THE STEWART SILVER REDUCING COMPANY.

The *Miner* gives statistics of the working of the mine of this Company for the six months ending April 8th, 1871. During this time the mill treated 1,085½ tons of ore, yielding $125,255 15, coin, being an average of $115 36, coin, per ton. For the treatment of this ore there was consumed 188½ tons of salt, or an average of 347.3 lbs. per ton of ore. There was also consumed 1,840 cords of wood, used both for the furnaces and for generating steam, being an average consumption of 1-7 cords to the ton of ore treated. The freight on salt consumed, $20 per ton from Denver, amounted to $3,770. To show what a railroad would do for this community, we are at liberty to state that the Stewart Silver Reducing Company pledge themselves to pay $10 per ton more for ore than they now do, as soon as a railroad is built to Georgetown. Another point of interest is developed by the above figures, to wit: estimating one ton of coal as equal to two cords of wood, we see that the Stewart works would have consumed 920 tons of coal during the past six months if they could have obtained the coal.

PIOCHE MINES—QUARTERLY SHIPMENT OF BULLION.

The Agent of WELLS, FARGO & Co., for Pioche, makes the following statement of the quarterly shipment of bullion through that office for the last quarter—January, February, and March: For January, $204,542 69; February, $232,388 31; March, $195,356 19—making a grand total for the quarter of $632,277 19. Commenting on this statement the Pioche *Record* says: "Give us more mills and we will give you more bullion than this, in any quarter you may name, and it need not be a good quarter, either."

WOMEN MINERS.

According to the Virginia City *Enterprise*, a tunnel is now being run south of the old Central Mining Company's tunnel, between A and B streets, for the purpose of prospecting the Comstock, which has never been explored in that section. The tunnel starts west of and back of the Maldenado building on B street. A company of ladies have the entire management, the work being superintended by a lady of this city. We do not see why women should not engage in mining as well as men. If they can rock a cradle, they can run a car; if they can wash and scrub, they can pick and shovel. Although some of the gentlemen friends of the ladies are attempting to persuade them from continuing the work, they are determined, and we are pleased to see it. We have received an invitation from the lady Superintendent, and will visit the works next week.

AT UNIONVILLE.

The Arizona Company, at Unionville, as we learn from the *Silver State*, has commenced work for the construction of a new mill with a capacity of 15 stamps. It will at first run on tailings that have accumulated at the other mills, and will run through 40 tons daily, which will pay $20 per ton, giving a yield of $24,000 monthly. The company has an enormous amount of tailings on hand, which are estimated at thousands of tons.

GOOD YIELD FROM TAILINGS.

DALL's mill, Washoe valley, recently, in one week, cleaned up $14,000 from a run of 17 days on tailings and slimes. About half of the lot of stuff run through the mill consisted of slimes.—*Carson State Register*

New Mexico.

NEW MINERAL DISCOVERIES.

A correspondent of the Sante Fé *New Mexican*, writing from Ricon del Tecolote, N. M., March 27, 1871, thus reports on the New mineral discoveries there: "You and your readers will, doubtless, be pleased to learn that there is every prospect of this place becoming a point of great importance, shortly, in the production of the precious metals. The present indications go to show that the galena deposits here are immensely extensive. Two or three veins of quartz, heavily charged with galena, are now being developed. It is known that about sixteen years a ago, a Mexican, named IGNATIO SANCHES, took out of a gulch opposite this town a considerable amount of very pure gold, and lately gold has been washed out in wooden *bateas* from several places in the edges of the hills bounding the valley. Thus, you see that the opinion ought not to be deemed extravagant that placer diggings might be discovered here by adepts in that class of mining. A Mexican (JUAN RAFAEL SERNA) has discovered a gold-bearing vein of quartz, and having washed a double handful of dirt from the surface, got several specks of fine-looking gold, one of which was larger than the head of a pin. He has worked a great part of his life in mining regions, and says that from the appearances of the quartz and surrounding rocks, he feels confident his discovery will prove very valuable. Another Mexican (RAMON TRUJILLO) a few days ago discovered a quite extensive and apparently rich vein of copper-bearing quartz, which, it is my belief, will prove to contain a large percentage of gold or silver. Many specimens have been taken from the vein, containing native copper. Immense beds and veins of heavy percentage iron ore are to be seen in the hills skirting this valley, and a narrow vein of pure iron was found a short time since in the extreme edge of a very wide lode of black quartz. Iron pyrites exist extensively in the vein discovered by SERNA. Copper pyrites have been found in nearly all the quartz lodes yet discovered. M. RUDOLPH, an old resident of the valley, has found some beautiful specimens of copper pyrites, mixed with feldspar, and they, with specimens of all the different kinds of quartz taken from the lodes in this neighborhood, are to be seen in his little collection, which, he desires me to say, is open to the inspection of any one interested in its examination. There is a mining district established called "Black Rock Mining District," and comprehensive and beneficial rules and regulations adopted for the government of miners within its limits. I have been advised by some persons to refrain from publishing the statements for the present, on account, as I am told, of the doubts concerning the value of the lodes discovered; but as I entertain the belief that these lodes are valuable, and that many more exist in the mountains around here, I see no reason why these facts may, and ought not be made known, so that experienced men may come, if so disposed, to satisfy themselves and probably find other lodes more valuable than these. It is true your correspondent has but a limited knowledge of geology and metallurgy, and consequently can make no positive assertion concerning the value of the discoveries already made, but the general belief of persons of experience who have seen the "lay" of the country and nature of the surface rock, appears to be that very valuable deposits of the precious metals can easily be found in this neighborhood."

California.

NEE GOLD SAVER.

The Nevada *Transcript* has the following: A new gold saver has just been completed by THOM & ALLEN at the foundry in this city. It is simple, not expensive, and requires very little power to run it. It is called Johnson's Batea Separator and Amalgamator. The machine just completed is to be set up at the Pennsylvania mill near this city, where its value will be fully tested. It receives the pulp as it comes from the battery, and is designed to save the powdered mercury and gold which escapes from the coppers of the battery. The machines are made of cast iron, are five feet in diameter, and are covered with sheet copper. The pulp is discharged in a basin in the centre, and flows over upon sheets of copper sloping towards the circumference of the machine. While this is being done the machine is kept in motion about the same as a shaking table, causing a friction of the amalgam against the copper plates, and the gold escaping from the battery is caught. Should any quicksilver escape by passing over the plates it is caught by a gutter of sheet iron which runs around the rim of the machine, while the water and sand flow over, passing into a sluice arranged to carry them off.

Utah.

SOUTHERN UTAH MINING ITEMS.

The Salt Lake *Herald*, of April 13, has the following from the Utah *Pomologist*, of St. George. The success of the Pinto iron works is a matter of Territorial congratulation. From Colonel S. M. BLAIR, of the Union Iron Works, Iron City, at Little Pinto, we have received a fine lump of gray cast iron, apparently of excellent quality, and are informed that all is now ready practically for business. The boys have had a hard struggle, and we are glad to hear of their success; send on your orders for casting railroad iron and the like. Within the last month a number of copper and silver-bearing leads have been discovered in the vicinity of Harrisburg, Leeds, Washington, and this city, and some very rich specimens of copper ore from a point south some sixty miles. At Harrisburg a district has been formed, and quite a number of claims made. We have seen many very fine specimens of bullion that have been smelted out in a blacksmith's forge. The excitement is considerable in this whole region, and expectation is on tiptoe.

MARKET REVIEW.

The Coal Trade.

NEW YORK, April 28, 1871.

Efforts have been continued during the past week toward an amicable settlement of the difficulties existing in the coal regions—prominent among which is that of Mr. CHAS. PARRISH, President of the Wilkesbarre Coal and Iron Company. The following is Mr. PARRISH's circular:

"WILKESBARRE, PA., April 22, 1871.

"MESSRS. CALL, THOMAS, AND CLINTON—COMMITTEE:

If the difficulty at No. 6 be first satisfactorily arranged, the Wilkesbarre Coal and Iron Company will resume work at all their collieries on or before the first of May, under the following conditions:

The men of your District (No. 12, W. B. A.) shall pass the following resolutions:

I. *Resolved*, That we hereby adopt the decision of Hon. WM. ELWELL, Umpire, made at Mauch Chunk, April 19th, as just and final between the men and the Company, and hereby pledge ourselves to be governed by the same in all particulars.

II. *Resolved*, That a standing committee of six persons be chosen, (three by the Company and three by the men), to whom all questions, as to wages, or as to any and all other differences, which may hereafter arise between the Company and the men, (except such as are already settled by the decision of Judge ELWELL), shall be submitted for settlement, a majority of whom shall make decision; and in case said committee shall be unable to decide by a majority, they shall choose a seventh man as umpire, whose decision shall be final and binding upon both parties.

III. *Resolved*, That whenever hereafter any difficulty, disagreement or dissatisfaction shall arise on the part either of the men or the Company, work at the collieries shall not on that account be suspended, but the men shall keep steadily at work, and leave all differences to be settled by the committee mentioned in the second resolution.

CHARLES PARRISH,
President Wilkesbarre Coal and Iron Co."

The second resolution the miners particularly objected to, claiming, however, only the right to regulate their own wages. Other attempts have met with no better success, and therefore the actual state of affairs is no different from what it was at our last reporting. The effect of a partial or probable resumption is always more or less felt in the market, and in consequence prices rule lower. There seeme to be very little demand from any quarter, and the supply (some 25,000 tons per week) is sufficient to meet it. The adoption of Cumberland coal has something to do with a light demand for anthracite. The best Cumberland coal can be bought for from $6 50 to $7 per ton, and many of our leading steamship and ferry companies and steamboats, all large consumers, are using no other, and state that they intend to use it hereafter. This will give our bituminous coal interests an opportunity to regain their lost laurels, and will greatly strengthen that section of our country in a commercial point of view. The only anthracite coal in market is the Wilkesbarre and Schuylkill. The first named may be quoted: Lump and Steamer at $8: Broken and Egg, $8 25; Stove, $9; Chestnut, $8 25, on board at Hoboken. Schuylkill coal is selling at abont 25c. to 50c. below these rates. These prices show a very weak market, when we take into consideration the great length of time the strike has been in force.

FREIGHTS.—Vessels are in plentiful supply, but there is very little offering. We heard Boston and Portland quoted as low as $1 40 to $1 60; New Haven and Bridgeport, 90c.; harbor, 45c.

Anthracite Coal Trade for 1870 and 1871.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending April 22, 1871, compared with week ending April 23, 1870.

COMPANIES.	1870. WEEK.	1870. TOTAL.	1871. WEEK.	1871. TOTAL.
*Phila & Reading R. R.	19,936	814 990	10,654	657,195
†Schuylkill Canal	1.074	54,173	9,346	60,648
Lehigh Valley R. R.	54,312	970,950	12,460	431,489
Lehigh & Sus. R. R.	20,423	260,076	15,344	118,689
†Lehigh Canal	4,062	23,949	1,166	1,369
Scranton North	12,065	190,559	....	....
" " South	35,620	518,302	....	....
Penn. Coal Co., rail	24 768	288,287	....	3,566
" " " canal	949	1,185	....	....
Del. & Hud. Canal Co.	46,742	112,187	2,160	4,660
" " East	9,642	149,593	633	52,144
" " West	1,075	27,599	....	12,720
South	10,147	85,913	....	....
Shamokin	5,876	86,413	20,344	165,364
Trevorton	1,152	72,005	....	....
Lykens Valley Coal Co.	255	328	....	18,715
Wyoming South	....	570	....	....
Wyoming North	....	....	....	....
P. N. Y. C. & R. R. Co.	3,765	93,169	41	35,343
Williamstown Col'y	5,974	74,903	....	....
Big Lick Col	1,732	3,946	3,146	29,122
Total	258,658	3,839,187	77,309	1,591,023
1870	77,309	1,591,024		
Decrease week and year	182,349	2,248,164		

* Less coal transported for Company's use and Bituminous coal.
†Closed for the season.

Bituminous Coal Trade, 1870 and 1871.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending April 22, 1871, compared with week ending April 23, 1870.

COMPANIES.	1870. Week.	1870. Year.	1871. Week.	1871. Year.
R. & O. R. R.	20,227	209,566	30,863	313,135
C. & O. Canal	18,027	46 228	19,029	107,247
‡ Cumberl'd Branch	1,687	19.245	1,355	22,410
‡ " Canal	3,704	11,166	5,568	33,257
E. & B. T. R. R.	7,393	81,616	9,848	101,046
Harrisburg & D.	13,950	165,781	22,065	204,438
L. V. R. R.	864	5,156	10,591	23,325
P. & N.Y.C. & R. Co.	1,769	61,528	5,585	87,221
Total	67,601	600,286	104,904	892,109
			67,601	600,286
			37,303	291,823

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railroad during the week ending Saturday, April 22, 1871:

From St. Clair	
" Port Carbon	1,210 00
" Pottsville	177 11
" Schuylkill Haven	1,538 18
" Auburn	2,168 14
" Port Clinton	5,529 13
" Allentown and Alburtis	31 08
" Harrisburgh and Dauphin	22,065 05
Total paying freight	32,719 09
Coal for Company's use	4,250 16
Total for week	37,070 05
Previously this year	796,911 13
Total	833,981 18
To same time last year	1,033,438 11

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Saturday, April 22, 1871.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	5,237 10
" Port Clinton	4,109 00
Total for week	9,3 6 10
Previously this year	51,302 02
Total	60,643 12
To same time last year	54,173 03

Philadelphia & Reading Railroad and Branches.

COAL TONNAGE

For the Week ending Saturday, April 22, 1871.

BY RAILROAD—ANTHRACITE.

PASSING OVER MAIN LINE AND LEB VAL. BRANCH.

	Tons. Cwt
From St. Clair	
" Port Carbon	1,210 00
" Pottsville	177 11
" Schuylkill Haven	1,538 18
" Pine Grove	976 10
" Tamaqua	5,529 13
" Harrisburg	54 08
" Dauphin	6,324 11
Total	15,771 12

FOR SHIPMENT BY CANAL.

Passing Frackville Scales	
" Mill Creek "	412 06
" Schuylkill Valley Scales	804 16
" Mt. Carbon "	540 16
" Cressona "	3,845 04
" Pine Grove "	
" Tamaqua "	2,691 02
Total	8,294 04

SHIPPED WESTWARD VIA NORTHERN CENTRAL RAILROAD.

Passing Locust Gap	4.593 07
" Shamokin	8,294 13
" Herndon	
Total	12,888 08

SHIPPED WEST OR SOUTH FROM PINE GROVE.

Via Schuylkill & Susquehanna R. R.	492 00
" Lebanon & Pine Grove Branch	632 02
Total	1,124 02

CONSUMED ON LATERALS.

From Frackville Scales	13 10
" Mill Creek "	109 12
" Schuylkill Valley Scales	845 13
" Mt. Carbon "	297 12
" Cressona "	100 03
" Pine Grove "	50 12
" Tamaqua "	250 01
Total	1,666 13

LEHIGH AND WYOMING COAL.

Received via Allentown, E. Penn'a Br.	31 08
" " Alburtis, " "	
" " Plymouth R. R., G. & N. Br.	
" " Connecting R. R. "	
" " Willow Street R. R.	
Total	31 08

BITUMINOUS.

From Harrisburg	15,687 02
" Connecting R. R., G. & N. Br.	
" Junction R. R.	91 03
Total	15,778 05

COAL FOR COMPANY'S USE

Anthracite	4,156 04
Bituminous	194 02
Total	4,350 06

RECAPITULATION.

	Total for Week.	Corresponding week last Year.	
Passing over Main Line and Leb. Val Branch	15,771 11	21,221 04	d 5,449 13
For Shipment by Canal	8,294 04	2,682 14	i 5,611 10
Shipped Westward via Northern Central R. R.	12,888 00	1,816 17	i 11,071 03
Shipped West or South from Pine Grove	1,124 02	286 11	i 837 11
Consumed on Laterals	1,669 13	2,003 19	d 333 06
Lehigh and Wyoming Coal	31 08	2,924 17	d 2,893 09
Total Anthracite paying fr'gt	34,775 18	30,936 02	i 8,839 16
Bituminous	15,778 05	10,110 07	i 5,667 18
Total of all kinds paying fr'gt	55,554 03	41,046 09	i 14,507 14
Coal for Company's use	4,350 06	2,357 17	i 1,992 09
Total Tonnage for Week	59904 09	43,404 03	i16,500 03
Since Dec. 1, 1870	1013525 17	1156285 16	d142759 19
Total to date	1073430 06	1199690 02	d126259 16

SHIPPED BY CANAL.

	Total for Week.	Corresponding week last Year.	
From Schuylkill Haven	5,237 10	835 10	i 4,402 00
" Port Clinton	4,109 00		i 4,109 00
Total Tonnage per Week	9,346 10	835 10	i 8,511 00
Since Dec. 1, 1870	51,302 02	53,513 13	d2,211 11
Total to date	60,648 12	54,349 03	i 6,299 09

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending April 22, 1871—Compared with same time last year.

WHERE SHIPPED FROM	WEEK 1871., tons ct	WEEK 1870. tons ct.	YEAR 1871 tons cwt.	YEAR 1870. tons cwt.
Wyoming Region	17996 11	26322 15	112203 01	276675 18
Upper Lehigh Region		4064 13	4614 06	26677 18
Beaver Meadow Region		817 08		6632 02
Hazleton Region	6 01	691 15	1126 18	1.012 00
Mahanoy Region				
Trescow Region			1043 03	
Mauch Chunk Region	698 12		20354 04	30089 18
Totals	18701 04	32096 11	139341 12	349387 16
Increase				
Decrease	13395 07		209746 04	
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	15344 02	26423 03	18698 06	260076 03
Forwarded East of Mch Chunk by Canal	1165 18	4062 07	1399 09	23949 09
Delivered at and above Mauch Chunk	2106 15	934 07	16659 18	11588 13
Delivered to L. & B. R. R. at Plymouth Bridge		5399 10		44800 16
L. V. R. R. at Packer'n	84 09	1287 04	2624 08	8672 15
Totals	18701 04	32096 11	139341 12	349387 16
Of the above there was transported on acc'nt of L. C. & N. Co.	698 12	963 00	21590 11	45430 02
W.-B. C. & I. Co.	16144 02	12277 10	90327 09	104206 02
Totals	16842 14	13240 10	111918 00	149636 04
Increase	3602 04			
Decrease			37718 04	

Report of Coal Transported over Lehigh Valley Railroad

Report of coal tonnage for the week ending April 22, 1871, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	TOTAL. Tons. Cwt
Total Wyoming	786 00	73,482 01
" Hazleton	1,766 17	216,031 17
" Upper Lehigh		442 06
" Beaver Meadow		75,248 15
" Mahanoy	10,637 07	131,922 13
" Mauch Chunk	74 05	2,166 03
Total Anthracite	13,264 09	499,293 15
Bituminous Coal from all sources	10,591 00	23,325 00
Total by rail and canal	23,855 09	522,618 15
Same time last year	61,646 11	1,114,563 11
Increase		
Decrease	37,791 03	591,944 16
Forwarded East from Mauch Chunk by rail	12,460 09	431,489 17
Same time last year	54,312 18	970,950 05
Increase		
Decrease	41,852 09	539,460 08

RECAPITULATION.

Forwarded East from Mauch Chunk by rail	12,460 09	431,489 17
To N. C. R. R., at Mount Carmel		18 00
Forwarded North from L. & B. Junction	41 14	35,299 02
To L. & S. R. R. at Packerton for rail	53 06	2,313 01
Delivered at M'h Chunk		
Delivered on line of road above Mauch Chunk	15 00	393 15 3,697 12
Delivered above Mauch Chunk for use of L. V. R. R.	605 00	16,144 18
To L. & S. R. R., at Penn Hav., for railroad		94 10
Do. for canal		7,097 01
At M. Chunk for canal	89 00	2,745 19
Total Anthracite	13 264 09	499.293 15
Bituminous Coal	10,591 00	23,325 00
Total all kinds	23,855 09	522,618 15

Pennsylvania Coal Company,

Shipments of Pittston Coal for the week ending April 22, 1871.

	1871. WEEK.	1871. YEAR.	1870. WEEK.	1870. YEAR.
By Railway	3,566 08	25,717 11	21,768 02	298,287 02
" Canal	— —	— —	949 09	1,185 09
Total	3,566 08	25,717 11	22,717 11	299,472 11
Decrease 295,906 03 tons.				

Delaware and Hudson Canal Company.

The following is a statement of Coal transported by the Delaware and Hudson Canal Co., for the week ending April 22, 1871.

	WEEK.	SEASON.
By Del. and Hud. Canal	2,160 00	4,660 00
By Railroad East	633 00	52,144 00
" West		12,720 00
" South		
TOTAL TONS,	2,793 00	69,524 00
For the same period last year.		
by Del. and Hud. Canal	46,742 00	112,187 00
By Railroad East	9,142 00	149,593 00
" West	1,075 00	27,599 00
" South	10,147 00	85,913 00
TOTAL TONS,	67,636 00	376,292 00

Report of Coal forwarded by Pa. & N. Y.

R. R. Co., for week ending April 22, 1871.

	BITUMINOUS. Tons. Cwt.	ANTHRACITE. Tons. Cwt.
By Rail	5,585 16	41 14
Previously this year	81,635 06	35,302 02
Total by Rail		
By Canal		
Previously this year		
Total by Canal		
Total for the year	87,221 02	35,343 16
To the same time last year	61,528 00	93,169 12
Increase	25,693 02	d57,825 16

Statement of Coal Transported over Cumberland and Pennsylvania Railroad

During the week ending Saturday April 22, and during the year 1871, compared with the corresponding period of 1870.

WEEK.

	To C. & O. Canal. Tons. Cwt.	To B. & O. R. R. Co Tons. Cwt.	Total. Tons. Cwt.
1871	19,029 05	30,863 13	49,892 18
1870	18,027 14	30.2.7 17	38,255 11
Increase.	1,001 11	10.635 16	11,637 07
Decrease			

YEAR.

1871	107,247 12	313 135 19	420.383 10
1870	46,228 18	208,566 14	254,795 1
Increase.	61,018 14	103,569 05	64,587 1 8
Decrease			

Cumberland Branch.

WEEK.

1871	5,568 19	1,355 19	6.924 18
1870	3,704 18	1,687 03	5,392 01
Increase.	1,864 01		1,533 17
Decrease		331 04	

YEAR.

1871	33,257 11	22,440 09	55,698 00
1870	11,166 18	19,245 09	30,412 97
Increase.	22,090 13	3,195 00	25,285 13
Decrease			

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

	AT NEW YORK, May 2. SCHUYLKILL. R.	A.	W.	A.	AT PHILADELPHIA, May 2. R.	A.	W.	A.
Lump	$—		$—		—	—	—	—
Steamer	—	—	—	—	—	—	—	—
Broken	7 75		—	—	—	—	—	to —
Egg	8 75 to 8 25		— to —		—	—	—	to —
Stove	8 75 to 9 00		—	—	—	—	—	to —
Chestnut	8 00 to —		—	—	—	—	—	to —
Pea	—	—	—	—	—	—	—	—
LEHIGH.								
Lump, (along side)	—	—	—	—	—	—	—	—
Broken	—	—	—	—	—	—	—	—
Egg	9 00		9 00		—	—	—	—
Stove	10 25		10 50		—	—	—	—
Chestnut	9 00		—	—	—	—	—	—
Pea	—	—	—	—	—	—	—	—
SPECIAL COALS.*								
Diamond Vein	R.	A.	8 00		—	—	—	—
New England	"	"	—	—	—	—	—	—
Locust Dale	W.	A.	8 50		—	—	—	—
Honey Brook, Le'h	W.	A.	9 00 to 10 50		—	—	—	—
Spring Mountain	"	"	9 00 to 10 50		—	—	—	—
Sugar Creek	"	"	9 00 to 10 50		—	—	—	—
Sugar Loaf	"	"	9 00 to 10 50		—	—	—	—
Old Comp'y's	"	"	9 00 to 10 50		—	—	—	—
Cross Creek	"	"	6 00 to 10 50		—	—	—	—
Room Run	"	"	—	—	—	—	—	—
Girardville	"	"	—	—	—	—	—	—
McMichael	"	"	—	—	—	—	—	—
Shamokin	"	"	9 50		—	—	—	—
Lykens Valley	"	"	—	—	—	—	—	—
Broad Top	"	"	9 50		—	—	—	—
Hill & Harris	"	"	—	—	—	—	—	—
Henry Clay	"	"	—	—	—	—	—	—
Powelton	"	"	9 50		—	—	—	—

[*Dealers in these coals may be found in our advertising columns.]

Company Coals.

May, 1871.

No quotations during strike.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	— —	— —	— —	— —	— —	— —
Pittston at Weehawken	— —	— —	— —	— —	— —	— —
Lackawana at do	— —	— —	— —	— —	— —	— —
Wilk'b're at Hoboken	8 00	8 25	8 25	8 25	9 00	8 25
Old Co. Lehigh at Pt. Johnston	— —	— —	— —	— —	— —	— —
Lehigh at E. Port	— —	— —	— —	— —	— —	— —

For freights to different points see "Freights."

Prices for Coal at Mauch Chunk.

May 1871.

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein..f.o.b. at Phila.	$ —
Lemon " " "	— —
Cumberland Vein Coal	— —
Consolidation Coal Co.'s on board N. Y.	6 75
Maryland Coal Co. " "	6 75

Prices at Baltimore—May, 1871.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$— —@— —
Pittston and Plymouth, do	— —@— —
Shamokin Red or White Ash, do	— —@— —
Lykens Valley Red Ash, do	— —@— —
Zerba Valley	— —@— —
Trevorton	— —@— —
By retail, all kinds per ton of 2240 lbs.	— —@— —
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 75@4 85
Fairmont and Clarksburg gas, f. c. b. at L. Point	6 00@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

May, 1871.

George's Creek and Cumberland f. o. b. for shipping..$4 30

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@— —
Lykens Valley	— —@— —
Shamokin Red or White Ash	— —@— —
Trevorton and Zerba Valley	— —@— —

Prices of Gas Coals.

May, 1871.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr., 41-43 Pine st., N. Y

Duty, $1 25, gold

	Coarse.	Slack.
Block House	$1 75	@-1 75
Gowrie	1 75	@-1 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@- 80
Lingan	1 60	@- 80
Little Glace Bay	1 60	@1 00
Caledonia	1 60	@- 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Currency.
Westmoreland	7 10 @7 25
Fairmount Gas Coal Co. of N. Y.	7 50 @- —
Despard Coal Co	$7 50 @- —
Penn	7 75 @8 00
Newburg Orrel Gas	— — @— —
West Fairmount Gs Coal	8 00 @— —

AT PHILADELPHIA.

Powelton	$7 75

Prices of Foreign Coals.

May, 1871.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street New York.

Liverpool Gas Caking	$ 9 00@— —
" " Cannel	11 50@12 50
" House	— —@16 00
" " Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel,	18 00@20 00

Per ton 2,000 lbs. delivered.

Freights.—May, 1871.

TO EASTERN PORTS.	From Philadel'a.	From E. Port and Port Johnston.	From Newbury	From Rondout
Amesbury	$2 50	$2 00		
Bangor	2 30	1 60		
Bath	2 30	1 75		
Boston	2 50	1 50		
Bridgeport	1 75	1 00		
Bristol	2 00	1 40		
Cambridgeport	2 75	1 75		
Derby	2 00	1 20		
Dighton	2 30	— —		
East Cambridge	2 35	1 75		
Fall River	2 50	1 40		
Hackensack	1 75	1 00		
Hartford	2 50	1 25		
Jersey City	1 41	50		
Middletown	2 25	1 25		
Mystic	— —	1 25		
New Bedford	2 00	1 40		
Newburyport	2 65	1 85		
New Haven	1 90	1 00		
New London	1 76	1 25		
Newport	2 00	1 40		
New York	1 35	50		
Norwalk	1 50	1 00		
Norwich	2 00	1 30		
Pawtucket	2 30	1 50		
Portland	2 30	1 50		
Portsmouth, N. H.	1 45	1 85		
Providence	2 00	1 25		
Rockport	2 10	1 65		
Saco	2 25	1 75		
Sag Harbor	1 70	1 20		
Salem	2 35	1 65		
Stamford	2 00	1 00		
Stonington	2 00	1 30		
Taunton	2 30	1 75		
Warren	— —	1 40		
Washington	1 25			
TO RIVER PORTS.				
Albany				
Catskill				
Cocksackie				
Coeyman's				
Cold Spring				
Fishkill				
Haverstraw				
Hudson				
New York				
Nyack				
Poughkeepsie				
Rhinebeck				
Rondout				
Saugerties				
Sing Sing				
Stuyvesant				
Tarrytown				
Troy				
West Point				
Yonkers				

Foreign and Provincial Freights.

May, 1871.

Closed for the winter.

Foreign.

Newcastle and Ports on Tyne, per keel of 21 1-5 tons	£14 00@£16 00
Liverpool, 5 per cent primage	13s @15s ton.

TO NEW YORK.

Provincial.

Sidney	$ —
Lingan	—
Cow Bay	—
Port Caledonia	—
Little Glace Bay	—

TO BOSTON.

Sydney	$ —
Lingan	—
Cow Bay	—
Port Caledonia	—
Little Glace Bay	—

Rates of Transportation to Tide Water.

Closed for the Season.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon	$4 00
Less drawback of 50 cents on all Coal shipped east of New Brunswick and south of Cape Henry.	
MAUCH CHUNK TO ELIZABETHPORT.	
L. V. Railroad from Mauch Chunk to Easton	$1 84
C. R. R., N. J., Easton to Elizabethport	2 69
Shipping expenses at Elizabethport	25
Warfage	10
Total	$4 88

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$1 84
C. R. R., of N. J., Easton to Pt. Johnson	2 72
Shipping expenses	25
Warfage	10
Total	$4 91

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ —
Morris & Essex R. R. Easton to Hoboken	—
Shipping expenses	—
Warfage	—
Total	$ —

TO SOUTH AMBOY.

L. V. R. R.	—
R. & D. R. R.	—
Cam. & Am. R. R.	—
Shipping Expenses,	—
Total	$ —

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	—
C. RR. of N. J. Easton to Elizabethport	—
Shipping expenses	—
Wharfage	—
Total	$ —

METALS.

NEW YORK, April 27, 1871.

IRON.—Duty: Bars, 1 to 1½ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1½ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb: Pig, 7 ℔ ton; Polished Sheet, 3cents ℔ lb; Galvanized 2½; Scrap Cast, $6; Wrought, 8 per ton,

	Store Prices.
Pig, Scotch No. 1, ℔ ton	33 00@36 00
Pig, American, No. 1	34 00@36 00
Pig, American, No. 2	32 00@34 00
Pig, American, Forge	31 00@32 00
Bar Refined, English and American	— —@75 00
Bar Swedes, assorted sizes (gold)	85 00@100 00
	Store Prices, Cash.
Bar, Swedes, ord'y sizes, less 5 ℔ ct.	110 00@115 00
Bar, Refined " "	77 50@ — —
Bar, Common " "	85 00@ — —
Scroll " "	—@ — —
Ovals and half-round " "	100 00@120 —
Band " "	95 00@105 00
Horse Shoe " "	92 50@ 95 —
Rods, ¾ to 3-16 inch " "	82 50@123 —
Hoop " "	100 00@140 00
Nail rod	— —@6¾ —
Sheet, Russia, assto Nos. (gold)	10¼@—11
Sheet, Single, D. and T. Common	—4½@— 6
Sheet, Gal'v'd, Nos. 14 to 26 9 and 12c. Nos. 27, 28, and 29, 12@14	
Rails, English (gold), ℔ ton	55 00 @57 00
Rails, American, at Works in Pa.	70 00 @72 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ lb or under, 2¼ cents; over 7 cents and not above 11, 3 cents ℔ lb: over 11 cents, 3½ cents ℔ lb, and 10 ℔ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ℔ lb	— 15 @— 18
English Spring (2d and 1st quality)	— 7 @— 10
English Blister (2d and 1st quality)	— 10 @— 17
English Machinery	— 11½@— 14
English German (2d and 1st quality)	— 13 @— 15
American Blister "Black Diamond"	— — @— 12
American, Cast, Tool do.	— 16 @— 17
American, Spring, do.	— 9 @— 11
American Machinery, do.	— — @— 12
American German, do.	— 9 @— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 30
Copper Bolts	— @— 32
Copper Braziers, 16oz. and over	— @— 32
Copper Nails	36 @— 38
Copper, Old Sheathing, &c. mixed lots	— @— 19
Copper, old, for chemical purposes	20 @— 21
Copper, American Ingot	21¼@— 21½
Yellow Metal, New Sheating	— @— 22
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cents ℔ lb: Pipe and Sheet, 2½ cents ℔ lb.

Galena, ℔ 100 lbs.	$— — @— —
Spanish (gold)	6 15 @6 18
German, do.	6 15 @6 18
English, do.	6 20 @6 50
Bar (net)	— — @8 75
Pipe (net)	— — @10 25
Sheet	— — @10 25

Colwell, Shaw & Willard Tin-Lined Pipe 15 cts. ℔ lb.

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.: Plate and Sheets and Terne Plates, 25 ℔ cent.; Roofing 25. ad val.

	Gold ℔ lb.
Banca	33 @—38½
Straits	32¾@33
English	32¾@33

PLATES.

	Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ℔ box	$8 50	@8 75	$9 62½@10 00
I. C. Coke	7 25	@7 75	8 25 @ 8 75
Coke Terne	6 12½	@7 12½	7 00 @ 8 25
Charcoal Terne	7 75	@8 25	8 75 @ 9 50

REMARKS.

IRON.—The market for Scotch Pig remains quiet, the demand being entirely for small parcels to meet the wants of consumers, but with a light stock, prices are supported. The sales are 100 tons Glengarnock, in lots from yard, at $34; and to arrive, 100 do. Eglinton, $32; 75 do. Glengarnock, $33; and 150 do. Gartsherrie, on private terms. American continues in limited request, but prices are unchanged; we quote No. 1 $34@$36, and No. 2 $32@$34. New Rails remain quiet, but steady at $55@$57, gold, for English, and $70@$72, currency, for American, at the works in Pennsylvania; 600 tons Old T and Double-Headed sold on private terms. Refined Bar continues, as long noticed, dull and unprofitable, but steady at our quotations.

TIN.—The market for Pig is at a stand, and prices are in a great measure nominal. Straits is held at 32¾@33 cents, with 50 slabs sold at the latter price. English 32¾@33 cents, and Banca 38@38½, gold. Plates have advanced 6d. ℔ box in England recently, but prices here, with a very dull market, do not respond. Charcoal Terne, however, remain very firm, being scarce and wanted. The sales are 1,250 boxes Assorted Charcoal Tin at $8.37½ for ordinary, and $8.50 for good brands; 250 do. Charcoal Terne, $7.87½, gold; and 500 do., at a private price.

COPPER.—The manufactures of Copper and Yellow Metal are steady at our quoted rates. Ingot is in fair demand, and previous prices are well sustained; sales have been made of 300,000 lbs. Lake at 21¾@21½ cents, the latter price for lots, and 500,000 lbs. do. for June, July and August delivery at the same figure; Baltimore is quiet, but held at the same price as Lake; 25,000 lbs. Tennessee sold at 21¾ cents.

LEAD.—The demand for Pig is very light, and we have only to notice the sale of 25 tons Spanish at $6.18, gold. Bar 8¾ cents, and Pipe and Sheet 10½, cash, less 10 per cent. to the Trade, and Tin-lined Lead Pipe 15, less 2 cents to the Trade.

ZINC.—Spelter, Foreign, 4 to 6c., gold; Spelter, Domestic, 11c., currency; Zinc Sheet, Foreign, 9c.; Zinc Paint, French, (dry), 10½c.; Zinc Paint, American, 7c.; Per Oxide—Manganese, lower grade, 3½c.; Per Oxide—Manganese, Pyrolusite, crystal, 5½c.

Mining Stocks.

NEW YORK, April 28, 1871.

The following quotations are reported by the New York mining stock board:—

PETROLEUM STOCKS.

	BID.	ASKED.
Bergen Coal and Oil	—	—
Bennehoff Run	70	—
Blood Farm	—	—
Breevoort	30	50
Bliven Oil	35	—
Buchanan Farm	35	50
Central	74	85
Clinton	—	—
Home	—	160
Phillips Pet	—	—
Rynd Farm	30	40
United Petroleum Farms	20	25
United States	60	—
National	—	—
New York & Allegheney	50	—
Northern Light	35	50
Pit ole Creek	65	—
Rathbone Oil	20	—
Second National	—	50
Sherman & B	—	—
Tarr Farm	—	—

GOLD STOCKS.

	BID.	ASKED.
Bates & Baxter	24	35
Benton	—	10
Black Hawk	—	35
Central Gold	10	12
Cons Gregory	40	60
Grass Valley	16	24
Gunnell	17	—
La Crosse	—	—
Liberty	—	3
Montana	—	—
Rocky Mount	—	—
Quartz Hill	19	25
Smith & Parmlee	37	50
N. Y. & Eldorado	—	—
American Flag	12	20

San Francisco Stock Market.

A telegram from San Francisco April 27, quotes mining stocks as follows:—

Savage	43⅛
Yellow Jacket	68
Kentuck	72
Chollar Potosi	78
Gould & Curry	52½
Belcher	75
Imperial	42
Amazon	—
Crown Point	—
Hale & Norcross	—

The Slate Trade.

[Corrected weekly.]

(A "square" represents 100 superficial feet.)

PRICES OF ROOFING SLATE.

Vermont purple, 1st quality, per square	$6 50@	7 00
" green, 1st " "	6 50@	7 00
" red, 1st " "	15 00@	16 00
" variegated, " "	5 75@	6 20
d. b'k and d'k blue, 1st qual., "	6 00@	7 05

PRICES OF ROOFING SLATE LOADED ON THE CARS AT POULTNEY.

Red, per square	$7 00 @	$11 00
Purple, " "	4 50 @	5 00
Best q'l. Unf'g. Gr'n. " "	4 50 @	5 00
Gr'n. or Vargtd. " "	3 25 @	4 25

VERMONT SLATE TRADE.

REPORT of Slate Shipped from Middle Granville, N. Y., via the R. & S. R. R., for the week ending April 22, and for the year 1871.

ROOFING SLATE.

NO. OF SQUARES.	Week.	Prev'ly.	Year.
†Penrhyn Slate Co.	155	715	870
New York, *and Middle Granville Slate Co	260	345	605
†American Slate Co.	....	....	....
Benj. Williams	33	350	383
Jones & Williams	....	....	....
Eagle Slate Co	....	60	60
Mettowee Slate Co	....	145	145
Albany Slate Co	....	55	55
H. W. Hughes	....	30	30
Total	....	....	—

MILL STOCK, MANTLES, &C.

NO. OF CASES SHIPPED BY	Week.	Prev'ly.	Total.
Eagle Slate Co. cars	148	1,153	1,301
Penrhyn Slate Co "	....	....	....

BLACK BOARDS.

NO. OF CASES.	Week.	Prev'ly.	Total.
Eagle Slate Co	....	....	....
Penrhyn Slate Co	....	....	....

MILL STOCK, &C.

NO. OF CARS SHIPPED BY,	WEEK.	PREVIOUSLY.	YEAR.
Eagle Slate Co. cars.	1	6	7
Penhryn Slate Co	....	....	....

* Sales made together this season.
† Consolidated Sales.

PENNSYLVANIA SLATE TRADE.

The following is a weekly statement of Roofing Slates, School Slates and Mantels, shipped from Slatington, via Lehigh Valley Railroad for last week, ending April 22, 1871.

ROOFING SLATE.

Jones & Williams	385 squares.
Locke Slate Co.	175 "
D. Williams & Co.	35 "
Saylor & Morgan	35 "

SCHOOL SLATE.

D. Williams	42 cases.
Lock Slate Co	9 "
Lehigh Slate Co.	9 "

MANTLES.

Lehigh Slate Co.	9 "

BY THE L. S. RAILROAD.

ROOFING SLATE.

Heimbach Slate Co.	391 "
Twin City Slate Co.	75 "

FLAGGING.

Heimbach Slate Co.	¾ tons.

FROM TREICHLER'S STATION.

Eagle Slate Co.	70 squares.
Continental Slate Co	91 "

LEHIGH CANAL.

J. M. Coffin & Co.	250 "

Car-Wheels and Axles.

A CORRESPONDENT of the Boston *Advertiser* writes, "Accidents from the breaking of axles, wheels, and rails, especially during the cold weather, are becoming alarmingly frequent. Scarcely a week passes that we do not read accounts of disasters from these causes, notwithstanding the vigilance of railroad managers. No confidence is felt by railroad men in the common rigid wheel, and no well-managed road allows them to run more than fifty or seventy-five miles without being thoroughly inspected. It is no uncommon thing to find a new wheel cracked after the first fifty miles. The man or men who will give us a remedy for these evils will confer a blessing upon the travelling public, the value of which cannot be computed. The crystallization of the axle by the continual jar of the rigid wheel, coupled with the effect of low temperature, is a fruitful cause of these breakages." Another correspondent calls attention to the manner in which axles are bought: "The buying road perhaps stipulates for best scrap axles—and what does that mean? Hoops and sheet-iron are prohibited in best scrap-iron, to be sure; but the separate pieces are as dissimilar in character and temper as if composed of different metals. A soft horse-shoe, with hard steel calks upon it, lies next to an old wagon-tire, brittle from the rumble of years, and a bolt, a bar, a pin, a bit, and a worn-out shovel or scythe, all go to make up the pile that is expected to stick together with a little heat. A large part of such a mass never was, perhaps anything but common iron, and the rest has lived and outlived its appointed days, and is ruined by the service. To heat such iron to a welding heat will seemingly improve it a little. It but little more than anneals it, and the benefit is temporary. The little new life breathed into a mass of the old wrought scrap-iron, by the present process of working is never permanent; it amounts to nothing, in fact, but a means often of allowing innocent and ignorant persons the means of deceiving themselves." According to this correspondent, "The scrapiron of thirty years ago was good, while that of the present day is very bad. The comparative freedom from accidents attended with loss of life is attributed to the fact that the strain upon axles is not ordinarily great, and that even a very poor axle may run for a long time without showing a defect. Even an axle of wood, carefully selected, might run for years, and be infinitely safer, with the thermometer below zero, than rotten iron."

Improvement in the Manufacture of Glue.

RENTSCH communicates the following important item to the *Deutsche Industrie Zeitung:*

In recent times numerous means have been discovered to preserve glue in the form of a jelly, and it has also been demonstrated that, in drying it, it loses greatly in adhesive qualities, the animal substance being altered by the oxygen of the atmospheric air, more or less, according to the state of the weather. This explains the fact why the quality of the glue of the same manufacturer is not always the same. CARL STALLING, in Tieschen (Saxony), offers glue which possesses all the original qualities of this substance in an unimpaired condition. The laborious operation of drying is obviated, and it is free from admixture. This glue is extracted from the bones by a peculiar method, which essentially consists in a treatment with cold water, under pressure, the glue obtained being in the form of jelly. In buying glue in tablets one never knows how much water he buys with it, (the glass-like glue contains, on an average, 12½ per cent.), but this is not the case with the glue of the above-named manufacturer, the proportion of which is easily ascertained by the consumer by means of BAUME'S hydrometer. It is prepared for use by boiling with water like ordinary glue. It is evident that glue, which is not exposed to a temperature favorable to spontaneous decomposition, and which is withdrawn from all the injurious influences of the weather by being hermetically sealed, must possess superior adhesive qualities, the more so as no chemicals have been employed to bleach it. But what is still more important is, that this glue can be sold much cheaper than the common article. While the average price of the latter ranges from 15 to 17 thalers (one thaler being 69 cents gold), the glue jelly is sold for 6⅔ thalers. Taking the larger amount of water into consideration, the price is still fifty per cent. below the price of the glue prepared in the usual way.

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Air, why it is propelled down, into and around the workings
" Quantity of, produced by the furnace.
" Friction of
" The great friction of produced by one mode of ventilation, and how reduced by another
" Pure added to impure (plans.
" Splitting of (plans)
" One current of (plans)
" One current of, and how to adopt separate currents (plan)
" Dividing of, but not into "separate and and distinct" current (plans)
" Crossings (see H on plans)
" Weight of in shafts
" How to find the weight of
" Table of pressure in shafts
" Expansion of
Inve city and force
" Rush of, into each division
" Quantity produced by natura ventilation
Splitting, why it should be adopted
Splitting, why the workmen object to Mr. Hopton adopting the mode
Anemometer, measurement of air by, engraving of
Area of a pit, how to find
Barometers, Showing the time of an outlet of gas in mines (engraving)
Bricks, how to find the number in the walling of a shaft.
Buddle's plan
Circumference of a pit, how to find
Coal, several ways of working it out, and why man methods of working it out are adopted
" Working out in banks (plans)
" Working it out in following up banks (plan)
" Working out in pillars (plans)
Working out in long wall (plans)
Working out in drifts (plans)
" Working out with no regularity (plan)
" Working out by the "end way" or in endings (plan)
Cubical Contents of a pit, how to find
Dialing, the mode f
Dials, several engravings
" How constructed
" How fixed in mine surveying
" Needle, its variations
Diameter of shaft
Dip of mine, how to find and lay on (plan)
Explosion, the power of an
" At Lund-hill, in what part of the mine it was supposed to take place (plan)
" How the power may be diminished
Furnace, how to find the horse-power of
" The place of fixing, to produce the largest ventilating current
" Engravings o ground floor, front a back view
" Remarks upon
ses, (carbonic acid) composition of
Do. properties of
(After, or choke damp) composition
(Carburetted hydrogen) do.
Choke damp and carbonic acid, not one and the same in quality
The effect produced on people by inhaling such
The quantity required for an explosive mixture
The elasticity of
The weight of
The nature and quality of
Why some mines generate and produce more than others
Why some mines generate a mixture of
Joaf, or gob, how tramrods are made through (plan
Lund-hill (plan)
Managers, who are best competent to manage mines
Miscellaneous questions
Natural ventilation
Planning, how workings are laid on the plan
Regulations (see R on plans)
Safety Lamps, why flame will not penetrate through, engraving of
Sections on mechanical ventilation
Summary of accidents
Surveying, how mines are with the dial
Surveying, how mines are with the theodolite
Tables of weights and measures
Temperature on surface
Temperature in mines
Temperature, difference of between down and up-cast
Theodolites for mine surveying
Theodolites, how constructed
Theodolites, the magnetic needle dispensed with, and how workings are laid on plan, with Theodolite surveying
Theodolites, how mines are surveyed with them
Up-cast larger than down-cast (plan)
Ventilating mines by mechanical power
Ventilation, several ways of
Weather, how a change of affects the workings
Workmen, capabilities of

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Air and Ventilation.

By Professor B. SILLIMAN, of Yale College. Delivered at the Cooper Institute, April 15th and 22d.

THE first lecture was devoted to the elements which compose our atmosphere, their properties and action upon other substances. The peculiar mode in which the two giants of the chemical world, Oxygen and Hydrogen, were in a manner compelled to a neutrality by virtue of their own properties, was a point dwelt upon at length, and fully illustrated by experiments, to bring before the audience the properties under consideration. The subject of Ventilation was taken up after a resume of the subject matter of the preceding lecture.

The first step was the consideration of some of the results of the act of combustion. This was first done by burning a candle under a glass receiver, the candle itself consisting of a solid hydrocarbon. Water was seen condensing upon the sides of the vessel as one of the first products. Next the flame began to grow dim, owing to the presence of carbonic acid, which was one of the most important products of combustion. The properties of this gas were then shown by a variety of experiments, and the lime-water test applied to the resulting gas after the candle had ceased to burn. This showed a decided milky hue, and gave the professor an opportunity to raise a small laugh at the expense of the milkmen. Carbonic acid was then obtained from powdered marble, and tested in various ways, showing it to be identical with that obtained from the burning candle. Both extinguished a lighted taper. The gas was then decomposed by means of burning magnesium, and the carbon thrown down as a black cloud upon the glass, and also diffused through the oxide of the metal. In the latter case, however, this was done by a solution of the magnesia and subsequent filtering.

Carbonic acid was then produced by the action of the lungs, the air passing through them. When a candle was immersed in this product, though not pure, it was instantly extinguished. Five-hundredths is sufficient, however, for this purpose. An experiment from the previous lecture, showing the diffusion of gases, was then performed, as some had not fully understood it on the former occasion. Attention was then called to the fact that the gas was heavier than the air, and hence was to be found when formed by nature at the bottom of shafts in mines, valleys, etc. It was shown that such places might be purified by several means, such as by dipping out the "foul air," as it is popularly called. This method was illustrated by nearly emptying a vessel filled with the gas, by simply dipping it up in a small pail, and emptying the latter.

Charcoal recently heated to redness is an admirable absorber of gases, and a quantity lowered into a well containing the gas would absorb such a quantity as to probably entirely purify it if it did not contain too much.

The effect of an atmosphere of hydrogen upon the voice was then illustrated by the professor, who pronounced a few words after inhaling a quantity of the gas. The voice was strangely changed, so much so that it would not have been recognized by any one.

The subject of ventilation proper was then taken up. Three candles burning at different heights, closed in a glass jar, were successively extinguished by the accumulation of the carbonic acid, which, contrary to popular belief, took place from the top downward, showing that the purest air was at the bottom. The same effect took place when there was a large chimney in the top of the jar, but which gave only one opening. Divide this chimney by a partition, and an imperfect ventilation was the result. The true method was then shown by means of a tight box having two chimneys in it, in one of which a taper was burning. This induced a strong downward current in the other, and so established a perfect ventilation. The point urged was this: Ventilation must be accomplished by a motive power. Let this be a lamp or fire, as in the cases shown, or the wind, which sometimes will not blow, and is then of no value, or a fan or a ventilating lamp, but in any case have something which will move the current. We must take the air from the tops of rooms that we wish to ventilate, because, if the draught is reversed we have the disadvantage of bringing all the impurities down from above, contrary to the laws of nature, for, though heavier than the air, they will rise by reason of their greater heat, and consequent small specific gravity for the time. But you may say this introduction of hot air below and cold above is not economical. Very true, if human life is cheaper than anthracite coal. But if not, we can have a little more and not destroy life quite as rapidly. The hot and foul air must be taken out and a fresh supply introduced.

Mr. PETER COOPER then took the platform, and desired to say a few words upon the ventilation of the great hall which has so frequently been maligned by the press of this city, both on account of its situation and supposed poor ventilation. Some thousand feet of steam pipe beneath the floor are used to warm the air which is distributed through holes in the floor under almost every chair. Several hot flues at the right of the stage carry the air from the upper part of the hall up to the open air. They extend some feet above the roof of the building. By means of them a constant draught is established. All the way around the walls are small ventilators, near which are connected with these main flues, and so help in freeing the hall from foul gases. By means of a fan-wheel, some twelve feet in diameter, cool air can be forced into the room when it is needed. The fan is capable of supplying some 50,000 cubic feet of air per minute, which is distributed under seats, as is the case with the warm air. He said that the hall had been spoken of as an underground place, tomb-like, etc., but it had its advantages. In case of an accident, no one would be injured in getting out. You will never get trod to death going up stairs. There is nothing combustible about the hall; the roof above is of iron and tiles; the latter constructed to reach from one beam to another, and so made as to allow the plaster to be laid directly upon them. I don't think there is a hall in the city where people are so safe. People incur little danger of being poisoned here by foul air.

Separation of Silver and Lead.

DENVER, COLORADO, April 3, 1871.

TO THE EDITOR: SIR—I have been delayed in sending an account of my process for separating silver and lead at an earlier period, from the fact that from want of proper apparatus I was unable to make any experiment until recently. I now give you the result, first giving a description of my apparatus, then the mode of the operation and its result.

The cylinder which I first experimented with was only nine inches in diameter; the one I now have is fifteen inches in diameter and three inches in length on the inside, that is, from head to head. The principles which underlie my process are:

First—That metals when in the metallic state do not enter into chemical combination when mixed or alloyed together.

Secondly—That metals when alloyed and reduced to a fluid condition and kept at rest in that condition for a considerable length of time, say an hour or more in a deep vessel, will become partially or approximately separated, according to their respective specific gravities. A familiar illustration of this is to be seen in a brass foundry—brass being composed of copper and tin, if kept at rest in a molten state for an hour will so completely separate as to destroy the quality of the brass.

Another well known instance of the same transposition is this: If silver and gold be mixed, reduced to the molten condition, and kept in that state for an hour in a narrow and deep crucible, and then allowed to cool without agitation, most of the gold will be found at the bottom of the crucible and most of the silver at the top.

This result is accountable for, on the principle that when these metals are reduced to the fluid condition by heat, their atoms are free to and do arrange themselves according to their respective gravities. When these metals are mixed and fused, each atom of each metal retains in its atomic state all of its properties and chemical characteristics. It would require too much space for me to go into detail on this subject, and I content myself with simply stating the general principles.

If when metals are thus mixed and in fusion, you employ mechanical force to assist their natural tendency to separate, you will accomplish that result in proportion to the force applied. The force which I apply is centrifugal force, generated by the rapid rotation of a hollow iron cylinder, in which the molten metal is placed for that purpose.

The cylinder I now have for experiment is made of cast iron, three-quarters of an inch thick, fifteen inches in diameter inside, and three inches thick, that is from head to head, so that the cake or ingot of metal after treatment will be of these dimensions. The cylinder is cast with one of its heads attached. In the other end is a flange two inches wide on which the other head of the cylinder is fitted, so that it may be put on and taken off at pleasure by means of bolts and keys or screws. This flange, and the head that fits on it, must be made so that the joint will be close, and so constructed that it may be luted and made perfectly close or tight when it is put together for use. From the centre of each of the cylinder-heads protrudes an axle, cast with it, and made strong enough for the purpose, on which the cylinder revolves. On the top or circumference of the cylinder is a hole about one inch in diameter, through which the cylinder is charged with the molten metal, and which is opened and closed with a screw or other appliance so as to be perfectly close. On one of the axles is fitted a spur wheel, by means of which the cylinder is made to revolve. I have a bed-plate cast with journal boxes, on which this cylinder is to be placed when ready to be operated. This bed-plate is placed on the top of a small furnace, of sufficient capacity to generate heat enough to keep the cylinder as hot as the metal to be treated.

I place the cylinder in its bearings over the furnace, make up a small fire, and revolve the cylinder slowly over it, so as to heat it up to the temperature of the metal to be treated. I then open the vent on the top, pour in the metal to be treated, close up the vent, and commence to revolve the cylinder, at the rate of about 250 to 300 revolutions per minute, keeping in the furnace just heat enough to keep the cylinder hot, and the metal within it in fusion. After I have revolved the cylinder thus for three hours, I withdraw the heat, keeping up the rotation until the cylinder is cold, and the metal within it solidified. (This will be accelerated by a blast of cold air blown into the furnace.) I then lift the cylinder from its bearings, take off the moveable head, and turn out the cake of metal, when I find the lighter metals in the centre, and the heavier ones on the outside, so that they may be cut apart in a lathe, or by any appropriate instrument.

I do not claim that this process will make an exact separation, unless, perhaps, when there were but two metals, when one might be cut pure from the inside, and one pure from the outside, leaving an intermediate ring or band to be treated again with others of like value.

Having thus described my method, I will now give the result of two experiments which I made recently, one in the small cylinder with very rich lead, and one in the large cylinder with very poor lead.

The first experiment, as I said, was with very rich lead—according to assay, it contained eleven hundred dollars to the ton. It was made in the small cylinder. I melted sixty pounds of this lead, containing about thirty-three dollars of silver. I added to it nine pounds of zinc, and, after heating my cylinder to the temperature of the molten metal, or a little more, I opened the vent on the top and poured in the metal. Closing the vent, I revolved the cylinder slowly for a few moments. This is done to mix the silver, lead, and zinc. I then stopped the rotation, and allowed the cylinder to stand for ten minutes. This I did to enable the zinc to come to the top mixed with the silver, which it will do by reason of its specific gravity. I then turned the cylinder rapidly half round, so as to throw the zinc to the bottom, whence it would again ascend to the top, by leaving the cylinder at rest for ten or fifteen minutes. This may be repeated three or four times, as by such manipulation, and a very slow motion of the cylinder, I obtain a most intimate mixture of the zinc with the mass, and thus bring it in contact with all of the silver in the mass, which the zinc, by its superior affinity, takes up, reducing the gravity of the silver to the mean between that metal and zinc, making it about 8½, and leaving the lead at its original gravity. After I had thus treated it, I commenced to revolve the cylinder at the rate of three hundred revolutions to the minute, and continued its motion at that rate for two hours and a half, keeping up heat enough in the furnace to keep the metal in fusion. At the end of the 2½ hours, I withdrew the fire and cooled the furnace with water, keeping up the rotation of the cylinder at the same speed until it was cold and the metal within it solidified. I then lifted it off from its place, took off the head, and turned out the ingot, which was nine inches in diameter and three inches thick, with a hollow core in the centre.

By means of concentric circles I divided this mass into eight rings, which I numbered, commencing with the outer one. A small section across all these rings, in the direction of the radius of the circles, was taken for assay to the mint, and gave the following results:

No. 1	contained	1.7	parts of	silver.
No. 2	"	3.	"	"
No. 3	"	11.5	"	"
No. 4	"	268.	"	"
No. 5	"	519.	"	"
No. 6	"	545.	"	"
No. 7	"	553.	"	"
No. 8	"	624.	"	"

These are the mint figures, and show, as you see, a concentration of 624 to 1.7-10. It illustrates also the principle in the gradual increase of silver from the outside to the inside. A few pounds more of zinc added to this experiment, and a longer period of rotation, would, I have no doubt, produce a much more decided result.

The second experiment was with the 15-inch cylinder, and with 180 pounds of lead containing $20 of silver per ton.

This experiment was prepared exactly as the former one. I heated the cylinder up to the proper point, that is, the temperature of the molten metal. I then poured in the melted metal, adding to it five pounds of zinc, and mixed as before stated by slow motion and stopping the cylinder. I then commenced to revolve the cylinder at a rate of from 250 to 300 revolutions per minute. I kept this up for three hours, keeping at the same time heat enough to keep the metals melted. At the end of three hours I withdrew the heat, and kept up the rotation of the cylinder at the same speed until it was cold and the metal solidified, when I stopped it, took off the cylinder, took off the head and turned out the ingot of the same shape as that from the first experiment, but of larger size. In this instance the metal was divided in the same manner as before, but the number of rings was increased from eight to fourteen.

Fifteen grains from No. 1 gave so small a speck or point of silver that it was with difficulty it could be seen in the cup with the naked eye. Prof. SCHIRMER said it was not more than would be in the same quantity of litharge. He says practically it amounts to nothing. The others gave the same results up to No. 12, which had an appreciable quantity; No. 13 a little more; No. 14 quite a respectable globule. We did not weigh them, as I was desirous to keep them in the cupels for exhibition to friends, as out of the cups none of them could have been weighed in the most delicate scales except Nos. 13 and 14.

All of the experiments which I have made produced similar results, and I am now fully satisfied that every succeeding effort which I make will produce the same result. Indeed, when I have an engine or other force to drive my machinery, so that I can continue the rotation of the cylinder for six or seven hours, the result will be a perfect one. I now desire to procure a wrought iron cylinder of the capacity of from 1200 to 2000 pounds. With this apparatus and this mode of treatment, I feel confident that I can concentrate the silver that is in one ton of lead into 100 pounds, at an expense of less than five dollars per ton, thus saving the expense of cupelling 1900 pounds of lead.

The zinc to be used in the process is to be distilled from the solid metal, converted into metallic zinc and used over again in a similar succession of processes, so that there is no loss. We find no trace of zinc in the samples outside of No. 12.

When I speak of the cost of concentrating a ton of lead, I speak with reference to the cost of working an establishment of the capacity of five tons per day. All the hoisting and lifting of cylinders would be done by means of cranes and pulleys, and the cutting of the concentrated metal by means of an upright lathe with an adjustable cutter. Four men and one ton of coal would treat five tons per day with great ease.

C. S. EYSTER.

Bessemer Works for Chicago.

ALTHOUGH possessed of extensive rolling-mills, Chicago has only just completed a building for the manufacture of Bessemer metal. The plan of these works—to consist of two engines of a thousand horse-power for driving the blowing machinery, ten boilers, two five-ton converters, six cupolas, and three hydraulic cranes—has already been contracted for. The Union Rolling-mill Company are the owners. The Bessemer works are expected to turn out seventy-five tons of steel rails per day, and will be under the superintendence of Mr. THOMAS ROBINSON, who has been engaged in Bessemer works in South Wales.

THE ENGINEERING AND MINING JOURNAL.

CONTENTS FOR THIS WEEK.

[*Illustrated Articles are marked with an asterisk.*]

The Auburn Mill at Reno, Nevada	273	Air and Ventilation	280
The Last of the Alchemists	274	Separation of Silver and Lead	280
Spectrum Analysis in Relation to the Bessemer Process	274	Bessemer Works for Chicago	280
The Present Condition of the Iron Industry	275	EDITORIALS:	
Railroad Records	276	Glaciers in Oregon and Washington	281
Temperature of the Sun's Atmosphere and its Internal Molten Mass	277	The Use of the Siemen's Furnace in the Bessemer Works	281
MINING SUMMARY	277	The Desilveration of Lead	282
MARKET REVIEW	278	The English Iron and Steel Institute	281
THE SLATE TRADE	279	OFFICIAL LIST OF PATENTS	282
Advertisements	279	Important to Inventors	283
		Advertisements	284

ROSSITER W. RAYMOND, Ph. D.,
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Glaciers in Oregon and Washington.

WE recently published the account of Mr. CLARENCE KING, describing the discovery of actual glaciers on the Pacific slope by members of his geological exploring party. The great interest which attaches to this discovery is everywhere acknowledged; and no little surprise has been expressed that previous explorers in the Cascade range did not happen to cross the unmistakable glaciers, the existence of which is now demonstrated by eye-witnesses. This strange mission Mr. KING explains in the case of Mount Shasta, by the fact that the ascent has usually been made on the south side, where there are no glaciers. Mr. HAGUE, who describes the glacier on the south side of Mount Hood, offers no explanation of the failure of other explorers to find it. Of Mount Rainier, it is reported only that Mr. S. F. EMMONS, accompanied by Mr. WILSON, "with great difficulty pushed through the forest to Mount Rainier, and laid the foundation of a similar survey of that cone." And finally, Mr. KING proposes, if his plans are sanctioned, "to include Mount Baker, Mount St. Helens, and Mount Adams, and, probably, San Francisco Mountain in this series of monographic surveys."

Mr. EDMUND T. COLEMAN writes from Portland, Oregon, claiming a priority in the discovery of active glaciers in the United States. He asserts that he first noticed them on Mount Baker, in August, 1866, in the company of Mr. JOHN TENNENT and Mr. JOHN BENNETT, both well-known citizens of Whatcom County, Washington Territory; and subsequently, in August, 1868, (on Mount Rainier, unless we mistake his meaning,) in the company of Captain STRATTON, of Port Townsend, Mr. DAVID OGILVY, of Victoria, and Mr. TENNENT aforesaid.

Mr. COLEMAN was for a number of years a member of the Alpine Club of London, has made several journeys on Mont Blanc, and twice reached its summit. During these journeys he travelled on every glacier having its origin in that mountain, ascended other high peaks in the Alps, and became intimately acquainted with the main features of glaciers, making numerous sketches on the spot. In 1858, Messrs. LONGMAN & Co., of London, published his illustrated work on the scenery of Mont Blanc, entitled "Scenes from the Snow Fields," of which Professor FORBES wrote in *Good Words*, 1862, "these beautiful illustrations have given for the first time an accurate representation of these astonishing scenes."

Some irreverent Oregon journalist having questioned Mr. Mr. COLEMAN's knowledge of the subject, he very properly appeals to this creditable record, and is quite justified in adding, "I therefore claim to be able to distinguish a glacier when I see one." According to his statement, moreover, Mounts Baker and Rainier possess all the well-known and familiar features of the great mountains in Switzerland, all of which bear glaciers.

It is curious that the mountains on which glaciers were observed by Mr. COLEMAN are among those which Mr. KING's party have not yet surveyed. His declarations therefore (the claim of priority aside) serve to extend and complete the discovery of the latter, indicating that all the members of this celebrated group of high volcanic peaks are glacier-bearing.

We do not question Mr. COLEMAN's claim. It is probable in itself, and apparently well supported by testimony. Moreover, the question is to us one of extreme insignificance, who first saw the glaciers. Possibly somebody may turn up who was there before either of the present parties to the question. CLARENCE KING himself tells a good story of ascending one day, with a scientific party, a mountain peak which "had never before felt the foot of man," and finding on the topmost summit, to the great disgust of all, the refuse tin-cans and newspapers of a previous picnic party! Who knows, whether, in some "cool, sequestered spot," by the great glaciers of the Cascade range, Mr. KING's surveys may not hereafter find a miner's cabin, or a "notice of location," or at least an old and well-thumbed copy of the ENGINEERING AND MINING JOURNAL?

But we have seen as yet no proof that Mr. COLEMAN published his discovery to the world. Nobody cares who saw the glaciers first; the scientific world is not benefitted by the mere barren discovery. It is the announcement and description that constitutes true service to science. The more Mr. COLEMAN knows about the subject, the less excusable would be his silence for four years, upon a matter which the ignorant might deem of slight importance, but which the expert knows to be interesting and important in the highest degree. Unless he can show that he communicated his observations before subsequent accounts were published, or give satisfactory explanation of his failure to do so, his happening upon a glacier in 1866 or any other year confers no more credit upon him than upon thousands of mountain goats and millions of hummingbirds, who preceded him in the discovery, and never told of it.

The Use of the Siemens Furnace in the Bessemer Works.

ALBERT BRUNNER, in the *Austrian Journal of Mining and Metallurgy*, calls attention to the fact in the ordinary method of melting iron for the Bessemer process, only the very best of fuel can be employed in the cupola or reverberatory used. White iron has not yet been successfully employed in the Bessemer process, but mottled iron, melted at a very high temperature and introduced into the highly-heated converter, has been advantageously worked. Difficulty has been experienced in maintaining a uniform temperature in the melting furnace, and although many improvements have been made in the construction and management of cupolas, the highly-heated charge of iron required cannot always be produced. In view of these facts, Mr. BRUNNER's recommendation that the Siemens furnace should be employed for this purpose would appear to be a good one.

Many Bessemer works are already provided with Siemens furnaces, but they are used for working over the steel and wrought-iron scrap produced, but a small quantity of which can be used in the Bessemer process. The Martin and Bessemer processes are to a certain extent complementary, and for this reason are advantageously worked together in the manner indicated.

Mr. BRUNNER is further of opinion that in erecting a Siemens furnace in Bessemer works, it should be placed as near the casting pit as possible, so that only a very short gutter will be necessary to connect it with the converter or casting ladle. The shorter the gutter the higher will be the temperature of the charge in the converter, and, as has been before intimated, the higher the initial temperature attainable in the converter, the less gray does the pig-iron employed require to be.

With this combination we can also employ a comparatively large amount of steel and wrought-iron scrap, either by melting it together with the pig-iron, or in a separate Siemens furnace. Should the accumulation of scrap be larger than can be utilized in this way, it may be converted into steel in the Siemens furnace by the Martin process, and the fluid contents of the furnace, when ready for casting, conducted by means of a gutter directly into the Bessemer ladle, and thence to the moulds, thus converting the Bessemer into a Siemens-Martin plant.

By means of this happy combination of the two processes, the complementary character of MARTIN's as compared with BESSEMER's receives an emphatic practical expression, and the intimate and necessary connection of these sister processes is placed in a decidedly convincing light.

In commenting upon the proposed application, Mr. THOMAS M. BROWN, in a recent number of the *Bulletin* of the American Iron and Steel Institute, says: "The attempts hitherto made to combine the Bessemer and Martin processes have generally been in an opposite direction to that proposed by our author, namely, to cause the decarburized iron (either before or after the addition of spiegeleisen), to flow on to the hearth of a Siemens furnace, where it is allowed to remain for some time in a molten condition, to facilitate the escape of the contained gases, or to be further treated or manipulated according to circumstances. This procedure was first suggested, we believe, by CHARLES ATTWOOD, of Wolsingham, England (who was likewise the first to suggest the employment of SIEMENS' furnace to make steel on the open hearth), and has been the fruitful source of numerous patented inventions since; but is not, as far as we know, in operation anywhere at present. The employment of two Siemens furnaces in connection with the Bessemer plant, the one to melt the charge of pig-iron and scrap, and the other to receive the decarburized iron for further treatment, would give us a theoretically perfect process, and one which we may yet see realized in practice."

The Desilverization of Lead.

WE publish in another column the inventors account of a new process for accomplishing the separation of silver and lead, which differs in some respects from any previously tried. The method is ingenious and worthy of the attention of metallurgists. As in most of the recent processes of desilverization zinc is employed, but centrifugal force instead of that of gravity is used to separate the alloy of zinc and silver from the lead. We have not yet had an opportunity of testing a sample sent us by Mr. EYSTER, and as the economical value of the process depends largely upon the completeness of the separation of the metals, we reserve a more decided opinion regarding the value of the process for another occasion.

The English Iron and Steel Institute.

THE following is a summary of a portion of the proceedings of this Institute at the annual meeting held in London on March 28th, 29th and 30th:

Mr. J. JONES read the report of the committee appointed to inquire into the distribution of iron ores in the United Kingdom. This was prepared at great length by a number of gentlemen selected by the committee. Messrs. J. BELL and J. JONES reported upon Northumberland, Durham, and North Yorkshire; Mr. J. T. SMITH on Cumberland and Lancashire; Messrs. GEORGE ADDENBROKE and T. PARLAN, South Staffordshire; Messrs. R. HEATH and C. H. HOMER, North Staffordshire, and Mr. T. WOODHOUSE, Cornwall and the Forest of Dean. These gentlemen had prepared a general description of the varieties of iron ore that were worked in their respective districts, the estimated production of each variety per annum, particulars of mines that had been recently opened, or of deposits of iron ore lately discovered, the probable extent of iron ore in each locality yet remaining unworked, and analyses of the principal varieties of ore.

The CHAIRMAN said the investigation of the iron ores of this country was of the utmost importance to them in all their future proceedings. He hoped the Committee would continue their proceedings until a fair and complete record was obtained.

Mr. R. HUNT, of the Mining Record Office, said he believed some error existed in the minds of the members from an apparent want of co-operation on the part of the Geological Survey. He assured the members of the Institute that the Mining Office was very desirous of assisting the members of the Institute in all their investigations. The next report was upon

MECHANICAL PUDDLING.

The committee expressed regret that their labors had not led them to those definite conclusions which they had desired. They ordered a complete set of apparatus from the works of M. DE WENDEL, France, but, owing to the war, the machinery had not yet arrived. It was intended to erect them at the Dowlais Ironworks, where their operations would be carefully watched. The Chairman said they were all aware of the advantages which would result from a full investigation of the question. He understood that in France considerable advancement had been made in mechanical puddling, and as they had one of the most eminent iron manufacturers from France present, he should invite him to speak.

M. SCHNEIDER addressed the Institute in French.

Mr. BELL said, at their last meeting they had an opportunity of witnessing the apparatus which had been devised by the ingenuity of Mr. MENELAUS for superseding the laborious occupation of the puddler; and they had been also witnesses of the good-humored disappointment which that gentleman had when he found that the result was not entirely what he had expected. M. SCHNEIDER had told them that in France they had not made the advance which they had been led to suppose; but he hoped that between the two countries, they would be able to obtain ultimately the result which the manufacturers so much desired.

Mr. MENELAUS spoke of the great desirability of easing the puddlers' labor; and he hoped that ultimately they would be able to make the work of the puddler far more pleasant and less laborious than it was at present.

ROLLING MILLS.

Mr. B. WALKER, Leeds, then read a paper upon modern appliances for reversing rolling mills for plates, bars, and rails. The great demand for large plates and bars had made the reversing of the rolls a necessity; but there were grave difficulties in the mechanical part of the operation which had not yet been satisfactorily solved. Several very eminent engineers had taken the matter in hand, but no invention had yet found universal acceptance. The paper drew forth a sharp discussion, in the course of which the several systems now in use found advocates. Mr. WALKER believes that a very heavy fly-wheel, though most desirable in good and cheap rolling, is a fruitful source of breakages in mills constructed on this principle. Allowing that mills might with safety be worked at thirty revolutions a minute, this speed is far too slow for rolling ship plates, bars, or rails, and there has been of late a great demand for a means for reversing the rolls at a much higher speed. Mr. NASMYTH was the first to suggest, and Mr. RAMSBOTTOM to work out and apply, an approved system which is comparatively independent of speed, and mills on this principle can be so constructed that whatever may be the size and speed of rolls, they can be easily reversed, whilst the mills can be driven by either horizontal or vertical engines. The reversing motion is of the ordinary locomotive type, but instead of the reversing lever, there is a small hydraulic cylinder, and the labor required for working these engines is very small, though the speed and the reversing of the engines are under ready control of the workmen. In this plan, the rolls at each reverse start from a state of rest, the speed increasing as the steam is supplied to the engines, thus avoiding the shock caused by reversing the rolls with a clutch of full speed without any elastic medium. The sudden stopping of the machinery is effected by reversing the valve, thus bringing the steam on the other side of the cylinder, and experience has proved that although the engines may be run at a very high speed, there is not a violent shock in stopping, the steam acting as a cushion. Mr. RAMSBOTTOM's system does not admit of a fly-wheel, but the steam cylinders must be so large as at once, without any momentum of fly-wheel, to roll the plate. The next system noticed is one patented by Mr. F. W. KITSON, of the Monkbridge Ironworks, LEEDS, and Mr. CHALES. In this method, flat discs or conical clutches are brought together and held in contact with each other by means of hydraulic pressure,

the water being carried through the centre of the shaft. This system admits of the ordinary fly-wheels, and the rolls can be reversed at any speed. Mr. KITSON employs an ordinary flat clutch, with plain straight-faced hydraulic cylinders acting in a line with the main shaft. It is only necessary to move the clutch sufficient for clearance, say one-eighth of an inch, so that a very small quantity of water is required, and further, with this system two steam cylinders are not necessary; in fact, two mills may be driven from one cylinder, and it may be easily applied to existing engines and mills. In Mr. KITSON'S patent machinery, the engines and wheels always run in the same direction, the rolls only being reversed. The amount of friction surface is made so large that the clutches will do their work when greased without abrading the plate. At the time of starting, there is no work in the rolls, therefore there is only sufficient friction required to start the mills, and the additional pressure necessary for holding the surface and the clutches together comes on after the latter are in motion. The arrangement of the clutch with the shaft is so self-contained that there is no cross-stain put upon the bearings, and consequently no tendency to make the same hot.

The firm of TANNET & WALKER have another method of friction clutches for reversing gear, which consists of an ordinary cylindrical drum or collar, cast or bolted to the iron wheel. Round this drum or collar is a wrought-iron strap, and to this is coupled a hydraulic cylinder, acting at right angles to the main shaft. The water is admitted through the shaft, and this tightens the wrought-iron strap. Round the friction drum or collar this strap may be lined with hard wood, where the iron surfaces can be machined and greased, and thus made to fit each other. It is found that a very little pressure will draw this strap firmly round the drum, and give great driving power. Directly under the hydraulic cylinder is fixed a slide, which rests on the friction drum, so that the pressure requisite for drawing the strap round the drum has no tendency to bend the main shaft, the strains being entirely self-contained, as far as the drum and strap are concerned. At the outside of the strap are placed some spiral springs, and the instant the hydraulic pressure is released from the friction drum, the strap runs perfectly clear of it. The friction clutch can be applied the instant the workman wishes, as he need not wait until the claws of the clutch are in proper position. The fly-wheel power in connection with some mills working upon this system has now been made about 35 tons. The author thinks that the hydraulic friction gearing will be extensively applied to existing plate, bar, and rail mills. The paper was illustrated by diagrams, showing the different systems described in the paper.

Sir J. ALLEYNE said he was about to adopt a system of friction clutch, patented by Mr. NAPIER, of Glasgow. A differential lever was used instead of Mr. WALKER'S hydraulic cluth, and he had great expectations from its adoption.

Mr. MENELAUS said he had seen Mr. NAPIER'S patent, and, if proved successful in practical working, it would be the greatest stride yet made with regard to rolling iron and steel.

Mr. LEYDEN bore his testimony to the success of Mr. WALKER'S plan. He had a mill with three pair of rolls, which had been successfully run up to forty-five revolutions a minute, and had never yet struck out anything. Only last night he himself rolled one plate, 21 ft. by 5 ft., and three-eighths thick, and the system suited admirably. While rolling out another plate, the man at the brake put the brake on very suddenly, and the consequence was the plate had only got about half way through. The engines were brought to a dead stand, the brakes were taken off, the engines were started again at half speed, the brake was put on gradually, and though the plate was 7 ft. 6 in. wide, it took it out beautifully and laid it on the floor. He considered Mr. WALKER'S system as the best yet invented for the purpose, and one which was calculated to supersede every other appliance for reversing.

Mr. HEAD said the common system of reversing was very objectionable. On quiet nights he had frequently heard the clutches thrown in and out of gear when he was a mile from them. That would not be unless there was some mischief done by the blow.

Mr. LEYDEN said, in his mills, where there were three heavy pairs of rolls, a person might stand with his back to the rolls, ten feet from them, and not hear that they were being reversed.

The CHAIRMAN said he was glad to find that Mr. WALKER'S system had been so successful. The reversing of heavy masses in the old-fashioned rolling-mills was a source of frequent break-downs and loss of power, and it was most desirable to get rid of the old plan.

BISHOP'S METALOMETER.

Mr. ORLICK described an ingenious patent by Mr. BISCHOF for testing the malleability and ductility of metals. As a standard, the inventor took pure zinc, because he has found that it was most uniform, and nearly always returned the same test mark under similar circumstances.

Mr. BELL invited the members of the Institute to inspect a boring machine, capable of piercing granite at the rate of from 6 in. to 10 in. a minute.

The meeting was then adjourned.

SELF COKING BLAST FURNACE.

The Conference was resumed on Thursday, in WILLIS' Rooms, under the presidency of H. BESSEMER. There was a large attendance. The proceedings commenced with the reading, by Mr. JONES, the secretary, of a paper on "A Covered Self-coking Blast Furnace," which was written by WILLIAM FERRIE. By the new furnace a considerable saving of coal was effected upon the Scotch methods previously in use. Mr. MENELAUS said they had used nothing but raw coal in their furnaces, at Dowlais, for nearly fourteen years. They also led the gases from the furnaces, and took them down to the forges, within half a mile of the furnaces, where they were utilised in the production of steam. Mr. WILLIAMS, of Middlesborough, said a very large proportion of the saving of fuel in the new furnace was due to the increased height of the furnace; and the proportion of saving was very much the same as he got in his works by raising the furnace. In fact, they were able to effect a saving of thirty per cent. in the amount of fuel expended. He wished to mention one fact, which was interesting to them, and that was that they had seven furnaces, which never did anything else but produce pig-iron all the year round. He made an experiment on one of their tall furnaces with raw coal. Their own coal, he thought, was not sufficiently strong for the experiment, and so he brought up a quantity from Staveley, and it succeeded perfectly. With one exception, they were overwhelmed with gas. Their arrangements were made for the purpose of carrying off gas from the Durham coal, and they were obliged to let it go everywhere; and, after all, there was a back pressure which they could not get rid of. Mr. BELL bore testimony to the ease and accuracy with which the paper had been read, and spoke of the great obligation under which the Scotch ironmasters were, laid by the invention of Mr. FERRIE. He thought if Mr. WILLIAMS had wit enough to send for Staveley coal into Durham, that he would have been able to discover some method of getting rid of the gas to which he had referred. There was no doubt that Mr. FERRIE had shown the ironmasters of Scotland the way of manufacturing a ton of iron from something like a ton of coal less than before. This was a great deal to have accomplished, and he hoped that Mr. FERRIE would receive something more than an expression of gratitude from the ironmasters. He raised his furnace from 25 feet to 82 feet; they in Cleveland raised theirs from 48 feet to 80 feet, and had reduced the consumption of coal thereby.

The Chairman referred to the dividing walls of the furnace, which he thought an advantage where very heavy coal was used, which was apt, without such walls, to crush down inconveniently.

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113,961.—CHIMNEY-COWL.—Warren N. Abbott, New York, N. Y., assignor to himself and Isaac H. Wood.

113,962.—WAXED-THREAD SEWING-MACHINE.—Hosea P. Aldrich, Boston, Mass.

113,963.—BREECH-LOADING CANNON.—Hiram J. Allen, Arkadelphia, Ark.

113,964.—MACHINE FOR MAKING SKEWERS.—Chauncey Andrews, Paterson, N. J.

113,965.—KNITTING-MACHINE.—John M. Armour, Syracuse, N. Y.

113,966.—DUMB-BELL.—Ellis Ballou, Zanesville, Ohio.

113,967.—REVOLVING-CHAIR.—Franklin Barber, Detroit, Mich.

113,968.—APPARATUS FOR CARBURETING AIR.—Charles C. Beers, Boston, Mass.

113,969.—STOVE-DRUM.—Goderich Crouter Benton, Port Huron, Mich.

113,970.—WATCHMAN'S TIME-CHECKING CLOCK.—Ira G. Blake, Worcester, Mass.

113,971.—CULINARY VESSEL.—William H. Bloom, Tiffin, Ohio.

113,972.—FLOUR-BOLT AND REEL.—John R. Bradfield, Ada, Mich.

113,973.—MATERIAL FOR FILTERING.—Leopold Brandeis, Brooklyn, N. Y.

113,974.—TRUNK-FASTENER.—Damon W. Brockway, Dover, assignor to himself and Jonathan F. Parkhurst, Bangor, Me.

113,975.—ELEVATOR HAY-FORK.—John T. H. Brown, Greenup, Ill., assignor to himself and J. P. Ewart.

113,976.—ELECTRIC-TELEGRAPH SOUNDER, RELAY, &c.—Hugh Swinton Legare Bryan, Cedar Rapids, Iowa

113,977.—MACHINE FOR MANUFACTURING PICKS AND SIMILAR TOOLS.—Augustus Buerkle, Pittsburg, Pa.

113,978.—APPARATUS FOR VAPORIZING VOLATILE HYDROCARBONS.—John Butler, New York, N. Y.

113,979.—BABY-TENDER.—Alexander H. Carson, Newport, R. I.; and Andrew Brown, Troy, N. Y.

113,980.—LOCOMOTIVE SMOKE-STACK.—Edwin A. Castellaw, Savannah, Ga.

113,981.—BOAT-DETACHING APPARATUS.—David Lopez Cohen, Pensacola, Fla.

113,982.—LAMP-SHADE.—Michael H. Collins, Chelsea, Mass.

113,983.—APPARATUS FOR REEFING SAILS.—Alonzo G. Crossman, Huntington, N. Y., assignor to Franklin M. Crossman, same place.

113,984.—CENTER-BOARD FOR VESSELS.—Alonzo G. Crossman, Huntington, N. Y., assignor to Franklin G. Crossman, same place.

113,985.—DUST-PAN.—Francis L. Daniels and John Russell, Boston, Mass.

113,986.—FLASK FOR CASTING PIPE.—John Demarest, Mott Haven, N. Y., assignor to himself and Jordan L. Mott, same place.

113,987.—WASHING-MACHINE.—John Hilger Doll, Etna, Ill.

113,988.—WATCHMAN'S TIME-DETECTOR.—James Dunning, Bangor, Me.

113,989.—CONDENSING STEAM-ENGINE.—Thomas Edwards, Ladywood, Birmingham, England.

113,990.—HARVESTER.—John H. Elwood, Polo, Ill.

113,991.—PAPER-FILE.—George W. Emerson, Chicago, Ill., assignor to John R. Barrett, same place.

113,992.—SAW.—James E. Emerson, Trenton, N. J.

113,993.—SAW FOR SAWING STONE.—James E. Emerson, Trenton, N. J.

113,994.—MELODEON.—Peter Engers, Jefferson Furnace, Pa.

113,995.—MEDICAL COMPOUND FOR TREATING RHEUMATISM, &c.—William H. Farrar, Richmond, Va.

113,996.—BATTERY-GUN.—William Fields, Wilmington, Del.

113,997.—PREPARING AND MASHING GRAIN.—Charles H. Frings, Centreton, Mo., assignor to himself and Charles Braches, same place.

113,998.—HINGE FOR GATE.—George Garrett, Elkhart, Ill.

113,999.—APPARATUS FOR STAMPING WEARING APPAREL, &c.—Charles Gernert, Philadelphia, Pa.

114,000.—BUGGY.—James R. Gilman, South Bend., Ind., assignor to Studebaker Brothers' Manufacturing Company, same place.

114,001.—BURGLAR-ALARM AND HOTEL-ROOM INDICATOR.—Louis C. Gosson, Trenton, N. J.

114,002.—ATTACHMENT OF REVOLVING MOLD-BOARD FOR PLOWS.—Joseph S. Godfrey, Rochester, assignor to himself and Sears M. Loveridge, Pittsburg, Pa.

114,003.—CUTTING APPARATUS FOR HARVESTERS.—Phineas Gregg, Brownsville, Mich.

114,004.—IMPLEMENT FOR SLITTING AND JOINING RAGS FOR CARPETS.—Marion Green, Coldwater, Mich.

114,005.—ZINC FOR GALVANIC BATTERIES.—Edward A. Hill, Chicago, Ill.

114,006.—GALVANIC BATTERY.—Edward A. Hill, Chicago, Ill.

114,007.—HOTEL-ANNUNCIATOR AND FIRE-ALARM.—Edward A. Hill, Chicago, Ill.

114,008.—COMBINED TATTING-SHUTTLE AND CROCHET-NEEDLE.—Constantine Hingher, New Brunswick, N. J.

114,009.—HINGE FOR TABLE-LEAVES, &c.—Phillip Hires, Columbus, Ky

114,010.—VARIABLE CUT-OFF FOR ENGINES FOR WATER-WORKS.—Birdsill Holly, Lockport, N. Y.

114,011.—BRICK-MACHINE.—David James Hunter, Somerville, Mass.

114,012.—COFFEE-POT.—Peter H. Inman and Charles B. Withington, Janesville, Wis.

114,013.—DRUM FOR HEATING AND VENTILATING.—Royal Jennings, Shelbyville, Ind.

114,014.—PENDULUM-LEVEL AND CLINOMETER.—William Johnson, Edisto Island, S. C.

114,015.—CAR-COUPLING.—John W. Jones, of Philip De Catesby, Hereford, Md.

114,016.—CHURN-DASHER.—William F. Jones, Easton, Kan.

114,017.—PAINT.—William M. Jordan, Cambridge, assignor to Charles D. Weld, Boston, Mass.

114,018.—COOKING-STOVE.—John H. Keyser, New York, N. Y.

114,019.—MACHINE FOR MAKING STRAP-HINGES.—William J. Lewis, Pittsburg, Pa.

114,020.—PRINTING-PRESS.—John Cameron MacDonald, Waddon, and Joseph Calverly, Camberwell, England.

114,021.—DISCHARGE SPOUT FOR THRASHING, HULLING, AND SEPARATING-MACHINE.—Martin H. Mansfield, Ashland, Ohio.

114,022.—PADDLE-WHEEL.—Ebenezer Mathers, Harrisville, W. Va.

114,023.—GRAIN-SEPARATOR.—Joseph Miller, Detroit, Mich.

114,024.—FURNACE FOR STEAM-BOILERS.—Thomas F. Morrison, Bryan, Ohio, assignor to Morrison & Fay, same place.

113,025.—METHOD OF MAKING CARRIAGE-STEPS.—Francis B. Morse, Plantsville, Conn., assignor to H. D. Smith & Co., same place.

114,026.—DIE FOR FORMING FELLY-PLATES.—Francis B. Morse, Plantsville, Conn., assignor to H. D. Smith & Co., same place.

114,027.—ADJUSTABLE SPIRIT-LEVEL.—Joab Morse and Franklin B. Abel, Philadelphia, Pa.

114,028.—KING-BOLT FOR RAILWAY-CAR TRUCK.—Samuel W. Murray and Benjamin P. Lamason, Milton, Pa.

114,029.—WIRE FENCE.—Zebedee Nicholson, Haddonfield, N. J.

114,030.—WASHING-MACHINE.—James M. Noble, Delhi, Iowa.

114,031.—PAPER-FEEDING MACHINE.—Oliver Norelius, Minneapolis, Minn.

114,032.—NEWSPAPER ADDRESSING MACHINE.—Patrick O'Connor, Youngstown, Ohio.

114,033.—GANG-PLOW.—Joseph Oler, Eagle Point, Ill.

114,034.—SCAFFOLDING.—James D. Pettit, Rochester, Ind.

114,035.—HOT-AIR FURNACE.—John L. Pfau, Jr., Quincy, Ill.

114,036.—CURTAIN-FIXTURE.—Phineas W. Phillips, Salem, Mass.

114,037.—SHUTTER-FASTENER.—John D. Phyfe and John D. Perrine, New York, N. Y.

114,038.—WOOD PAVEMENT.—Albert Potts, Philadelphia, Pa.

114,039.—TRUSS-BRIDGE.—T. Willis Pratt, Boston, Mass.

114,040.—CULTIVATOR.—Isaac N. Pyle, Pleasant Mills, Ind.

114,041.—POTATO-DIGGER.—Squire Ransom, Kingsville, Ohio.

114,042.—APPARATUS FOR MAKING SULPHURIC ACID.—St. Julien Ravenel, Charleston, S. C.

114,043.—SAW-MILL.—John Richards, Philadelphia, Pa.

114,044, antedated April 12, 1871.—PLOW MOLD-BOARD.—Leman P. Rider, Pittsburg, Pa., assignor to himself and James Marshall, same place.

114,045.—FIRE-PLACE.—Patrick M. Roche, Cleveland, Ohio.

114,046.—HEATING-STOVE.—Peter Rohdin and Charles Ostergren, Chicago, Ill.

114,047.—SEED-PLANTER.—Charles R. Sargent, Newburyport, Mass.

114,048.—MACHINE FOR OILING WOOL, &c.—Charles G. Sargent, Westford, Mass.

114,049.—WATER-ELEVATOR.—Parker W. Sawyer, Gray, Me.

114,050.—CHURN.—Henri Schültdrees, Brookville, Ind.

114,051.—DIE FOR FORGING CARRIAGE-CLIPS.—Moses Seward, New Haven, Conn.

114,052, antedated April 22, 1871.—METHOD OF REDUCING PRESSURE IN STEAM BOILERS.—George Sewell, Brooklyn, N. Y.

114,053.—CARPET-STRETCHER.—Edward P. Shaffer, Rochester, N. Y.

114,054.—WAGON-BRAKE.—Richard C. Shockley, Fayette, Wis.

114,055.—HEATING-STOVE.—Absalom S. Shontz, Quincy, Ill.

114,056.—COTTON-PRESS.—Franklin Simmons, New Orleans, La.

114,057.—WIRE FENCE.—Arnold C. Sisson, Factoryville, Pa.

114,058.—CARRIAGE-WHEEL.—James Y. Sitton, Due West, S. C.

114,059.—FALLER FOR SPINNING-MULES.—Joseph Smith, Preston, England, assignor to Thomas Rawsthorne, same place.

114,060.—PASSENGER-REGISTER.—Moritz Springwoter, Louisville, Ky.

114,061.—FURNITURE-CASTER.—Augustus G. Stevens, Manchester, N. H.

114,062.—ANIMAL-TRAP.—John N. Stow and Robert Loop, Camden, Ohio.

114,063.—APPARATUS FOR COOLING AND MIXING SOAP.—James D. Sturges, Chicago, Ill.

114,064.—DRAWING-FRAME.—Gustavus E. Taft, Northbridge, Mass., assignor to "Whitin Machine Works," same place.

114,065.—COMBINED HAY-RAKE AND TEDDER.—Frederick A. Thayer, Sheldonville, Mass.

114,066.—SEED-PLANTER.—Charles J. Turner and Marcellous L. Wilkinson, Olean, N. Y.

114,067.—SHOE.—Charles E. Tyler, Georgetown, Mass.

114,068.—MACHINE FOR PUNCHING AND STAMPING METAL.—Isaac Van Hagen, Chicago, Ill.

114,069.—RECOLORING FABRICS.—John Murray Wallace, New York, N. Y., assignor to Bernard Weber, same place.

114,070.—GRATER.—Henry Clay White, Philadelphia, Pa., assignor to George Booth & Co., same place.

114,071.—FRICTION-BAND AND STOP FOR SEWING-MACHINES.—Francis E. Whiteside, Oxford, Pa.

114,072.—RUNNING-GEAR FOR CARRIAGES.—Eli Wigle, Bay City, Mich.

114,073.—STAVE-EQUALIZER.—Hiram S. Wiley, Madison, Ind.

114,074.—SPINNING-MACHINE.—Samuel M. Williams and Henry M. Williams, Coldwater, Mich.

114,075.—FIRE-PLACE.—Jonathan E. Wood, Webster, Ohio.

114,076.—CORN-HARVESTER.—Alvin N. Woodard, Fentonville, Mich.

114,077.—DIVIDING-WHEEL OF WEFT-THREAD KNITTING MACHINES.—Horace Woodman, Saco, Me.

114,078.—VALVE AND STEAM-CHEST FOR ENGINES.—Peter N. Woods, Fairfield, Iowa.

114,079.—GAIN-CUTTER.—E. H. Woodsum, Harrison, Me., assignor to himself and F. H. Whitman, same place.

114,080.—GAVEL-FORK.—Baxter Wright and William C. Park, Cardiff, N. Y.
114,081.—BREECH-LOADING FIRE-ARM.—Frederick J. Abbey and James H. Foster, Chicago, Ill.
114,082.—SUPPORT FOR CAMERA-BOXES.—Orin Ackerman, Carthage, N. Y.
114,083.—VACUUM-ENGINE.—Henry W. Adams, Philadelphia, Pa.
114,084.—PASSENGER-RECORDER. — George H. Aldrich, New York, N. Y.
114,085.—PLANE-IRON.—Ira Almy and Sereno A. Drake, Covert, N. Y.
114,086.—PAINT-BRUSH.—John Ames, Jr., Lansinburg, N. Y., assignor to John Ames, same place.
114,087.—PAPER-FEEDING MACHINE.—Ezra R. Andrews, Robert B. Randall, and William H. Clague, Rochester, N. Y.
114,088.—POTATO-DIGGER.—Sherman E. Anthony, Stillwater, N. Y.
114,089.—COOPERS' CROZE.—Joseph F. Applegate and Casper Feiock, New Albany, Ind.
114,090.—FLUX FOR REFINING IRON AND STEEL.—Edward T. Atwood, Minerva, Ohio.
114,091.—GLOVE.—Ezra Wilmoth Avery and Adaline Augusta Avery, Plymouth, N. H., assignors to A. W. Avery & Co., same place.
114,092.—APPARATUS FOR ELEVATING WATER.—Jared A. Ayres, Hartford, Conn.
114,093.—WASHING-MACHINE.—Junius S. Balsly, North Bend, Ky.
114,094.—HARVESTER-RAKE.—John Barnes, Rockford, Ill.
114,095.—KILN.—Arthur Batchelar, Brockham, Great Britain.
114,096.—ADJUSTABLE BEVEL.—Elbert A. Bell, Meriden, Conn.
114,097.—GRAIN-SEPARATOR.—Daniel Best, Yuba, Cal.
114,098.—POLISHING-MACHINE.—Samuel Bevan, Philadelphia, Pa., assignor to "Henry Diston & Son," same place.
114,099, antedated April 13, 1871.—TICKET-CASE FOR RAILROAD STATIONS.—John F. Birchard, Milwaukee, Wis.
114,100.—WAGON-BRAKE.—Simeon R. Bolton, Prescott, assignor to himself, Hannah Felt, of said Prescott, and Pascal P. Child, St. Louis, Mo.
114,101.—GATE.—Robert T. Browne, Fallston, Md.
114,102.—VENTILATOR FOR RAILROAD CARS AND DWELLINGS.—John Bradley, New York, N. Y., assignor to himself and Frank I. Kimball, Ramsey's, N. J.
114,103.—BUCKWHEAT-REFINER. — Daniel D. Brewster, West Daurens, N. Y.
114,104.—LIME-OVEN.—August Califf, Danville, Ill.
114,105.—PRINTING-PRESS.—Andrew Campbell, Brooklyn, N.Y.
114,106.—PRINTING-PRESS.—Andrew Campbell, Brooklyn, N. Y.
114,107.—BURGLAR-PROOF SAFE.—John W. Campbell, Sr., New York, N. Y.
114,108.—KEY-TAG.—Charles L. Carter, Washington, D. C.
114,109.—APPARATUS FOR THE MANUFACTURE OF BESSEMER STEEL.—Henry Chisholm, Cleveland, Ohio.
114,110.—PEN-AND-PENCIL CASE.—James M. Clark, Jersey City, N J.
114,111.—MECHANICAL MOVEMENT.—John Corley, near Coalfield, Kan.
114,112.—BED-SPRING.—Delos V. Crandall, Chicago, Ill.
114,113.—LAMP-CHIMNEY.—Thomas A. Davies, New York, N.Y.
114,114.—SILK AND THREAD-MEASURING APPARATUS. — Lucius Dimock, Leeds, Mass.
114,115.—FORGE-BONNET.—Walter Dunkerly, Woonsocket, R. I.
114,116.—DOUBLE-TREE.—Milton Durnell and Wesley Milner, Leesburg, Ohio.
114,117.—SPARK-ARRESTER.—William W. Elliott, Elliott's Mills, Miss.
114,118.—WEATHER-STRIP.—Lucius H. Ellsworth, William E. Wilcox, and Samuel Seabury, Peoria, Ill.
114,119.—POCKET FIRE-ESCAPE.—George A. England, Ripon,
114,120.—BROOM-HEAD.—Charles Fiscus, Washington, D. C.
114,121.—HEEL-DIE.—Benjamin F. Fisk and Mark B. Stone, Haverhill, Mass.
114,122.—AXLE-BOX COVER.—Walter H. Fitz Gerald, Brooklyn, N. Y., assignor to himself and Isaish A. Huson, Jersey City, N. J.
114,123.—SWITCH FOR CHANGING GAUGE OF CARS. — Thomas Fogg, St. Mary's, Canada.
114,124.—CAR-COUPLING.—Edwin L. Fareman, Rantoul, Ill.
114,125.—STEAM-ENGINE.—David R. Fraser, Chicago, Ill., assignor to himself an i W. P. Gates, same place.
114,126.—WASHING-MACHINE. — Henry A. Gaston, San Francisco, Cal.
114,127.—COTTON AND CORN-STALK CHOPPER.—James H. Gatling, Murfreesborough, N. C.
114,128.—CONNECTION OF BOOM TO MAST.—Alpheus Gill, Holmes' Hole, Mass.
114,129.—SELF-OILING PULLEY.—James Goodrich and Henry J. Colburn, Fitchburg, Mass.
114,130.—PRINTING-PRESS.—John Gough, London, England.
114,131.—HORSE-COLLAR.—William H. Gray, New York, N.Y.
114,132.—FEED-WATER HEATER.—Charles S. S. Griffing, Salem, Ohio, assignor to himself and Thomas Sharp, same place.
114,133.—FERTILIZING COMPOUND.—William Barkerville Hamilton, New Orleans, La., assignor to the New Orleans Sanitary and Fertilizing Company.
114,134.—VENEER-CUTTING MACHINE. — Thomas Hanvey, Rochester, N. Y.
114,135, antedated April 18, 1871.—WHEEL-SKATE.—George W. Hawk, Chicago, Ill.
114,136.—TORSION-SPRING FOR RAILWAY CARS.—Benjamin Hersh y, Erie, Pa., assignor to himself, E. Geer, Richard Dudley, and R. F. Gaggin, same place.
114,137.—DRIER.—Charles H. Hersey, Boston, Mass., assignor to "Hawes & Hersey," same place.
114,138.—TELEGRAPH-POLE.—Ira Hersey, New York, N. Y.
114,139.—MACHINE FOR THE MANUFACTURE OF ROOFING.—Dwight Hitchcock and Willis Gibbs, Syracuse, New York, assignors to Oliver T. Burt, same place.
114,140.—MANUFACTURE OF LAMP-SHADES.—John H. Hobbs, Charles W. Brockemier, and William Leighton, Jr., Wheeling, W. Va.
114,141.—STEAM-TRAP.—James Wilson Hodges, Baltimore, Md.
114,142.—COMBINED HEATER AND CONDENSER.—Birdsill Holly, Lockport, N. Y.
114,143.—SELF-HEATING POCKET-FLASK. — Seymour Hughes, Hudson, N. Y.
114,144.—ATTACHMENT TO GAS-SERVICE PIPE FOR AUTOMATICALLY CUTTING OFF THE GAS IN CASE OF FIRE.—William Humphreys, Waterford, N. Y.
114,145.—SHOE-SOLE.—John Morrison Hunter, New York, N.Y.
114,146.—STEAM-GENERATOR.—William H. Ivens, Trenton, N. J.
114,147.—CARRIAGE-AXLE.—Eldridge W. Ives, Hamden, Conn.
114,148.—CARRIAGE-AXLE BOX.—Eldridge W. Ives, Hamden, Conn.
114,149.—VEHICLE.—Robert Jack, Des Moines, Iowa.
114,150.—HORSE HAY-RAKE.—Oliver Smith Jarvis, Xenia, Ill.
114,151.—PUDDLING AND OTHER FURNACES. — John Allcock Jones, Richard Howson, and John Gjers, Middlesborough-on-Tees, England, assignors to Theodore Fox, Jeremiah Head, and Charles M. Newcomen, same place.
114,152.—CUPBOARD-LATCH. — Albert D. Judd, New Haven, Conn.
114,153.—MILKING-STOOL.—Judson N. Knapp, Syracuse, N. Y.
114,154.—WATER-WHEEL.—John L. Kurtz, York, Pa.
114,155.—SHUTTLE FOR LOOMS.—Julius Kuttner, New York, N. Y.
114,156.—APPARATUS FOR EXHAUSTING GAS, &c.—Robert Laidlaw and John Thomson, Glasgow, Great Britain.
114,157.—LUBRICATING RAILWAY JOURNAL.—Carrie R. Laman, Painted Post, N. Y.
114,158.—TUYERE FOR CUPOLA FURNACES.—Franklin Lawrence, Philadelphia, Pa.
114,159.—BAND-CUTTING ATTACHMENT FOR THRASHING-MACHINES.—John Lee, Jr., and John Lee, Sr., Duquoin, Ill.
114,160.—COOKING-STOVE.—William D. C. Lloyd, Louisville, Ky.
114,161.—ENVELOPE.—Philo Lockwood, Auburn, Ind.
114,162, antedated April 19, 1871.—BALANCE-VALVE.—Kellogg H. Loomis, New York, N. Y., assignor to James M. Boyd, same place.
114,163.—BLAST BY STEAM JET FOR FURNACES, &c.—Philip W. Mackenzie, Blauveltville, N. Y.
114,164.—MOLD FOR SEWER-PIPE.—Thomas Madeley, Rochester, N. Y.
114,165.—HARVESTER-RAKE.—John P. Manny, Rockford, Ill.
114,166.—HARVESTER-RAKE.—John P. Manny, Rockford, Ill.
114,167.—SHUTTLE FOR LOOMS.—Ezra W. Marble, Sutton, Mass.
114,168.—HORSE-POWER.—Daniel G. Marden, Memphis, Tenn.
114,169.—MACHINERY FOR DRESSING WHEEL-FELLIES.—Dudley Jefferson Marston, Amesbury, Mass.
114,170.—MACHINE FOR FORMING PLOW-HANDLES.—Elbridge G. Matthews, Oakham, Mass.
114,171.—WOOD-BENDING MACHINE. — Elbridge G. Matthews, Oakham, Mass.
114,172.—COMPOSITION FOR PAVEMENTS. — Frederick E. Matthews, Chicago, Ill.
114,173.—DUMPING-WAGON.—Samuel D. McCaleb and William McCaleb, Louisville, Ky.
114,174.—APPARATUS FOR MAKING ROOFING FABRICS.—David W. McConnell and William W. Pierce, Buffalo, N. Y.
114,175.—EXTRACTING METALS FROM ORES.—William P. McConnell, Washington, D, C.
114,176.—WATER-ELEVATOR. — Archibald A. McPheeters and Robert P. McPheeters, Arbor Hill, Na.
114,177.—GATE.—Job Lewis Meredith, Bloomingsburg, Ind.
114,178.—FENCE.—Levi Moore, Baraboo, Wis.
114,179.—WRENCH.—Francis B. Morse, Plantsville, Conn., assignor to H. D. Smith & Co., same place.
114,180.—SCROLL-SAWING MACHINE.—Jerome S. Moseley, Syracuse, N. Y.
114,181.—STOVE-PIPE CLEANER.—Daniel Murphy, Richmond, Va.
114,182.—CORN-HARVETTER.—Richard L. Nelson, Orange Court House, Va.
114,183.—MACHINE FOR BORING AND MORTISING.—Richard L. Nelson, Orange Court House, Va.
114,184.—TRACE-BUCKLE.—George Oldham, Jr., Cuba, N. Y.
114,185.—EARTH-AUGER.—Thomas Orchard, Sacramento, Cal.
114,186.—PHOTOGRAPHER'S STEEPING-TANK.—John Walter Osborne, Brooklyn, N. Y.
114,187.—PILE FOR NUT-BLANKS, TUBES, &c.—John Ostrander, Manchester, Va.
114,189.—FENCE-POST.—Joel A. Otis, Watertown, N. Y.
114,190.—WOOD PAVEMENT. — Halbert E. Paine, Milwaukee, Wis.
114,191.—ELECTROPLATING THE INTERIOR OF PIPES AND TUBES WITH SILVER, NICKEL, &c.—Dubois E. Parmelee, New York, N. Y.
114,192, antedated April 22, 1871.—REFINING SUGAR.—August F. W. Partz, Oakland, Cal.
114,193.—DRILL-CYLINDER.—Charles S. Pattison, North Adams, assignor to Burleigh Rock-Drill Company, Fitchburg, Mass.
114,194.—LUBRICATOR.—William Eaton Phillips, Silver City, Idaho Ter.
114,195.—TRUNK-FASTENING. — Louis Ransom, Lansingburg, N. Y.
114,196.—RAILWAY-SWITCH.—Peter V. M. Raymond, Charles City, Iowa.
114,197.—SEWING-MACHINE. — George Rehfuss, Philadelphia, Pa., assignor to American Button-Hole, Overseaming, and Sewing-Machine Company, same place.
114,198.—ADVERTISING DEVICE.—William Henry Reiff, Philadelphia, Pa.
114,199.—FOLDING-CHAIR.—Frederic W. Richardson, New York, N. Y., assignor to Christian A. Walcheid, Union, N J.
114,200.—BUTTON-FASTENER.—Archibald M. Richmond, New York, N. Y.
114,201.—TRACE-BUCKLE.—William G. Riley, Sullivan, Ind.
114,202.—ADMISSION OF FEED-WATER TO STEAM BOILERS. — Thomas Roberts, Baltimore, Md., assignor to himself and Edward F. Folger, same place.
114,203.—TONGUE FOR HARVESTER.—Martin Rohrer, Polo, Ill.
114,204.—WIRE THREAD FOR SEWING LEATHER.—Charles Rowland, Washington, D. C., and Nathan F. English, Hartland, Vt.
114,205.—POLE-ADJUSTER FOR HORSE-CARS. — Albert Gallatin Safford, Boston, Mass.
114,206.—GAS-REGULATOR.—Henry Shutte, Kansas City, Mo.
114,207.—RAILWAY SWITCH CHAIR.—George H. Scougale, Carson City, Nev.
114,208.—COOKING-STOVE.—John Segondy and MicSael Ravolo, St. Louis, Mo.
114,209.—SLAT FOR WINDOW-SHADES.—John Shorey and William D. Butler, Lowell, Mass.
114,210.—PORCELAIN-KNOB MACHINE.—Thomas J. Sloan, Bronxville, N. Y.
114,211.—WATER-WHEEL.—Ephraim L. Small, Urbana, Ohio.
114,212.—SWIVEL CLEVIS FOR PLOWS.—Josiah B. Small and Franklin F. Holbrook, Boston, and Elbridge G. Matthews, Oakham, Mass.
114,213.—STORE-TRUCK.—Andrew V. Smith, San Francisco, Cal.
114,214.—BUCKLE.—Earle A. Smith and Dwight L. Smith, Waterbury, Conn.
114,215.—COMBINED GRIST-MILL AND COTTON-SEED HULLER.—James W. Smith, Columbus, Ga
114,216.—LOW-WATER ALARM.—John Stanton, Philadelphia, Pa.
114,217.—TRUNK-LOCK.—Joseph Stanton, Buffalo, N. Y., assignor to John Kihlberg and Lewis P. Kirchmyer, same place, assignors to said Kihlberg and Michael Mesmer, same place.
114,218.—RUBBER VENEER.—Benjamin D. Stevens, Prairie du Chieu, Wis., assignor to himself, Nathan A. Wright, and John Conant, same place.
114,219.—FIRE-KINDLING.—John W. Still, San Francisco, assignor to Franklin Pancoast, Alameda, Cal.
114,220.—PLOW-COLTER.—Warren H. Stone, Lebanon, Mich.
114,221, antedated April 19, 1871.—PLOW.—Archibald L. W. Stroud, Munford, Ala.
114,222.—BOILER.—Daniel Sullivan, Bangor, Me.
114,223.—HAIR-DRESSING.—Franklin R. Taylor, Waverly, N. Y.
114,224.—ASH-SIFTER.—George W. Taylor, Baltimore, Md.
114,225.—SPRING-BED BOTTOM.—Austin E. Thayer, Philadelphia, Pa.
114,226.—SEED-DRILL.—John H. Thomas, Springfield, Ohio.
114,227.—FEED-ROLLER FOR GRAIN-DRILLS.—John H. Thomas, Springfield, Ohio.
114,228.—ENVELOPE.—J. Patton Thompson, Philadelphia, Pa.
114,229.—PORTABLE DRILLING-MACHINE.—William H. Thorne, Philadelphia, Pa., assignor to Thorne & De Haven, same place.
114,230.—BREECH-LOADING FIRE-ARM. — Frank Tiesing and Charles Gerner, New Haven, Conn.
114,231.—CLOTHES-WRINGER. — William H. Towers, Boston, Mass.
114,232.—SEEDER AND CULTIVATOR. — James T. Trowbridge, Akron, Ohio.
114,233.—BLASTING-FUSE.—Richard Uren, Santa Cruz, Cal.
114,234.—PREPARING AN EXTRACT OF MEAT.—Mann S. Valentine, Richmond, Va.
114,235.—GUIDE FOR CIRCULAR SAWS.—David W. Washburn, Brewer, Me.
114,236.—BALE-TIE.—Francis Watkins, London Works, Birmingham, England.
114,237.—PLOW.—Adam Weaber, Lebanon, assignor to himself and L. L. Heiks, Clear Springs, Pa.
114,238.—WATER-CLOSET.—Darius Wellington, Boston, Mass.
114,239.—MAIL-BAG FASTENING, &c.—Martin V. B. White, Fort Edwards, N. Y.
114,240.—BALANCE-WHEEL.—Frederick W. Wild, Baltimore, Md.
114,241.—HORSE-STALL.—John Wilkinson, Baltimore, Md.
114,242.—PREPARATION AND APPLICATION OF PROXYLINE FOR DENTAL PLATES.—Richard H. Winsborough, St. Louis, Mo.
114,243.—MIRROR-REFLECTORS.—Henry S. Wood and Jacob W. Morrison, Chicago, Ill., assignors of one-third their right to Jacob P. Pfanner, same place.
114,244.—COMBINED HARROW.—Cornelius Wyckoff, Jr., Fairview, Ill.
114,245.—CONDENSER FOR STILLS.—John Yates and Edgar Deuell, Brooklyn, N. Y.
114,246.—COMPOSITION BLACKBOARD.—Robert W. Young, Rising Sun, Ind.
114,247.—HOT-AIR REGISTER.—William Young, Easton, Pa.

REISSUES.

4,349.—FLUTING-MACHINE.—Henrietta H. Cole, New York, N. Y.—Patent No. 55,469, dated June 12, 1866.
4,350.—PISTON-PACKING. — Orrin Collier, Sacramento, Cal.—Patent No. 98,232, dated December 28, 1869.
4,351.—FALL-LEAF EXTENSION-TABLE.—Jacob Dourson, Columbus, Ohio.—Patent No. 87,829, dated March 16, 1869,
4,352.—DISINFECTANT OR CARBOLIC ACID SOAP. — Charles J. Eames and Charles A. Seely, New York, N. Y.; Charles J. Eames, assignor to Isabella Eames.—Patent No. 65,186, dated May 28, 1867.
4,353.—STANCHION.—Walter C. Clifford, Jamestown, N. Y.—Patent No. 105,145, dated July 19, 1870.
4,354.—LOCK-NUT.—James H. Gridley, Washington, D. C., assignor to H. L. Purdie.—Patent No. 62,483, dated February 26, 1867.
4,355.—LIGHTNING-ROD. — Lewis King, East Cleveland, assignor of two-thirds interest to Newell E. Smith.—Patent No. 49,733, dated August 29, 1865.
4,356.—PUMP-VALVE.—William H. Pollard, Seneca Falls, N. Y., assignor to The Goulds' Manufacturing Company.—Patent No. 73,038, dated January 7, 1868.
4,357.—MACHINE FOR BENDING WOOD.—Condit Prudden, Philadelphia, Pa.—Patent No. 54,012, dated April 17, 1866.
4,358.—SADDLE OR SWEAT CLOTH.—Robert Spencer, Newark, N. J.—Patent No. 41,944, dated March 15, 1864.

DESIGNS.

4,836.—INKSTAND.—Fred. D. Alling, Rochester, N. Y.
4,837.—LARD PAIL.—John J. Brockeé, New York, N. Y.
4,838.—SIDE OF A RAILWAY CAR.—Madison Buel and William Wood Lesley, New Castle, Del.
4,839.—ENVELOPE BLANK.—George Cade, Long Branch, N. J.
4,840.—MOSQUITO NETTING.—Thos. Carmichael, Newark, N. J.
4,841.—SHOW CASE AND DRAWERS.—George Penrice Farmer, Brooklyn, N. Y., assignor to E. C. Pratt, Brother & Co., New York city.
4,843.—COTTAGE FRONT.—Chauncy Graham, Elizabeth, N. J.
4,844.—FRONT OF A COUNTRY HOUSE.—Chauncy Graham, Elizabeth, N. J.
4,845.—END OF SCHOOL DESKS AND SEATS.—George H. Grant, Richmond, Ind.
4,846.—CLOCK FRONT.—Jonathan Moore, Jr., Brooklyn, N. Y.
4,847.—SCHOOL DESK AND SEAT.—Cyrus F. Palmer, Utica, N. Y.
4,848.—SAW FILING VISE.—Wm. A. Perkins, Salem, Mass.
4,849.—TOY STEAM ENGINE.—Edw. P. Rider, New York, N. Y.
4,850.—SASH WEIGHT.—Wm. H. Short, Brooklyn, N. Y.
4,851.—GAS FITTING.—Francis Ernest Thomas, New York, N. Y., assignor to Fellows, Hoffman & Co., same place.
4,852.—FAUCET HOLDER.—Carl Tielenius, New York, N. Y.

TRADE-MARKS.

227.—STOVE POLISH.—Robert E. Cherrington, South Boston, Mass
228.—PRINTERS' INK.—Chas. Eneu Johnson, Philadelphia, Pa.
229.—PIGMENT.—James H. Nason, Boston, Mass.
230.—CIGARS.—John C. Smith & Son, Baltimore, Md.

EXTENSIONS.

E. D. BUCKNAM, of Philadelphia, Pa., and SAMUEL A. SISSON, of Quensburg, Vt., executors of S. S. ALLEN, deceased. Letters Patent No. 16 957, dated April 7. 1857.
DANIEL S. NIPPES, Upper Merion township, Pa., administrator of ALBERT S. NIPPES, deceased. Letters Patent No. 17,110 dated April 21. 1857.
WILLIAM L. WILLIAMS, of New York, N. Y.—Letters Patent No. 17,061, dated April 14, 1857; reissue No. 2,131, dated December 19, 1865.
CORNELIUS MABTRATT, of Waterford, N. Y.—Letters Patent No. 18,108, dated April 21, 1857.
HORACE VANSANDS, of Middletown, Conn.—Letters Patent No. 17,243, dated May 5, 1857; reissue No 3,392.

DISCLAIMER.

WILLIAM L. WILLIAMS, of New York, N. Y.—Letters Patent No. 17,061, dated April 14, 1857; reissue No. 2,132, dated December 19, 1865.

IMPORTANT TO INVENTORS.

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CHARLES ROGERS, Solicitor and Manager.

In connection with the publication of the ENGINEERING and MINING JOURNAL and the MANUFACTURER AND BUILDER, we have frequently received applications from subscribers and patrons to act as their agents in transacting business with the United States Patent Office; and in view of the increasing number and urgency of such requests, we have resolved to add this department to our business. We have accordingly organized

A COMPLETE PATENT AGENCY,

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The special advantages of the ENGINEERING AND MINING JOURNAL, *as a medium for advertisers, are so great and so widely known that it may seem almost needless to call attention to them. It is extensively circulated among the engineers of the country and takes a position in this respect before any other publication of the kind. It has a large and constantly increasing circulation among miners and mine owners, and men connected with mining operations generally. As it is the only paper in the country that makes this subject a specialty it has this field entirely to itself, and is the only direct and reliable means of reaching this class of persons. Being kept on file by almost every subscriber, it is doubly valuable as a permanent means of keeping an advertisement before the public. It is the recognized organ of the coal trade, and is taken extensively by the trade throughout the country and presents the very best means of reaching that very important class of men.*

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New York.

THE CHALMERS-SPENCE PATENT NON-CONDUCTOR CO.

HEAD OFFICE: MORGAN IRON WORKS, NEW YORK.
ST. LOUIS BRANCH,
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Never deteriorates. Saves 20 per cent. Keeps steam perfectly dry. Thirty of the largest Mississippi boats have their boilers, pipes, etc., covered with this invaluable material. J. CHALMERS,
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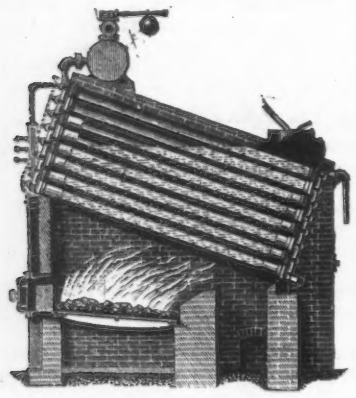

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Of the best quality for manufacturing, steam generating, and domestic purposes.

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FOR THE

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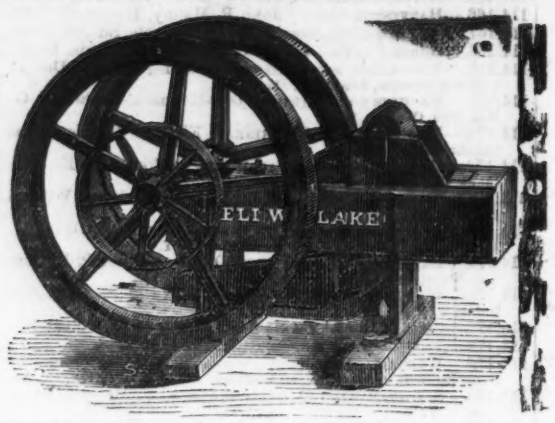
WESTERN & COMPANY.

MISCELLANEOUS.

BLAKE'S STONE BREAKER.



The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

Illustrated circulars, fully describing the machine, with ample testimonials to its efficiency and utility, will be furnished on application, by letter to the undersigned.

☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

Mch. 14-1y. **BLAKE BROTHERS, New Haven, Conn.**

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May 17:1y

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B S. GIBLIN, Treasurer. GEORGE A. BELL, President

WORKS NEWARK, N. J., OFFICE No. 61 MAIDEN LANE NEW YORK.

Franklinite Pig Iron (Spiegeleisen), Spelter, Oxide of Zinc, Spiegeleisen Cinder for Blast Furnaces.

May 24:1y

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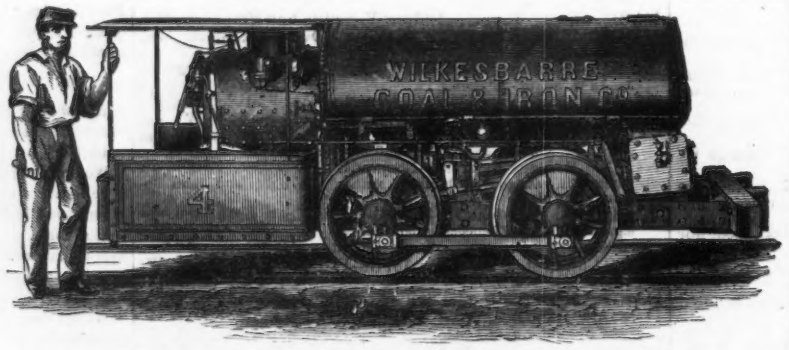
GORDON MONGES, Treasurer. B. C. WEBSTER, President.

WORKS, BETHLEHEM, PA. OFFICE, 333 Walnut Street, Philadelphia.

JOHN JEWETT & SONS, AGENTS, 182 FRONT STREET, NEW YORK.

OXIDE OF ZINC, SPELTER, SHEET ZINC.

Jun28:1y



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Gauge, two feet six inches or upwards; Hight above rail, five feet four inches; Width over all, five feet one inch; Adapted to burn Anthracite or Bituminous coal or coke.

Materials and Workmanship Equal to those in Full Gauge Railroad Locomotives.

Guaranteed to pass curves of twenty-five feet radius and haul on a level track in good condition

Three Hundred and Forty Gross Tons of Cars and Load.

For Photograph and full particulars, address M. BAIRD & CO.,
Feb:7:1y:eow Baldwin Locomotive Works, Philadelphia.

UNITED STATES DISTRICT COURT

In the matter of ABRAHAM BININGER and ABRAHAM B. CLARK, Bankrupts.

Notice is hereby given that the undersigned, as Assignee of the above-named bankrupts, will sell at public auction, at the Merchants' Exchange Salesrooms, No. 111 Broadway, in the City of New York, on the 17th day of May, 1871, at 12 o'clock, at noon, by E. H. Ludlow & Co., Auctioneers, two parcels of land adjoining each other, situate partly in Spottsylvania county, Virginia, and partly in Orange county, Virginia, containing together seven hundred and seven acres of land, known as the Vaucluse Gold Mining property, together with the mines, minerals, metals, and metallic substances, buildings, improvements, fixtures, and appurtenances thereto belonging, including two steam engines, and all other mining machinery and utensils used in the mining operations now, or recently, carried on at the said Vaucluse mine, etc.

The sale will be subject to confirmation by the Court.

Detailed description of the property, and an inventory of the improvements, fixtures, etc., may be had upon application to the undersigned, or to his attorneys, Messrs. BANGS, SEDGWICK & NORTH, No. 137 Broadway, or to the Auctioneers.

New York, March 16, 1871.,
JOHN S. BEECHER, Assignee,
No. 98 Front street,
e:o:w New York City.

STANDARD CLAY RETORTS.

FIRE BRICKS AND TILES,

STOVE LININGS AND FIRE CEMENTS.

Vitrified steam-pressed Drain and Sewer Pipe, and Manufacturers of Clay in general.

Baltimore Retort and Fire-Brick Works,

GEO. C HICKS & CO.,

apr1:4:eow:1y Baltimore, Md.

R. P. ROTHWELL,

MINING AND CIVIL ENGINEER AND METALLURGIST,

From the Imperial School of Mines, Paris, member of the Geological Society of France, etc,

OFFICE, WILKESBARRE, PA.

Having had a large practical experience in Europe and this country, is prepared to examine and report on all kinds of mineral property, superintend mines, and metallurgical works, assay ores, etc. 18-2-qp

MISCELLANEOUS.

1871.

"THE ENGINEERING AND MINING JOURNAL,"

AN ILLUSTRATED WEEKLY PERIODICAL,

Intended to advance the interests of those engaged in ENGINEERING AND MINING, in the widest sense of those terms.

VOLUME X. COMMENCED JAN 4.

ENGINEERING.

It contains matter of the highest importance to all who are engaged in

CIVIL ENGINEERING, as in the erection of buildings the construction of industrial works, public and private, the surveying and laying out of roads, canals, railroads, etc., and the erection of bridges, docks, etc. Being the recognized official organ of the American Institute of Architects, the various papers on subjects connected with building, which are from time to time read before the Institute, will be published in its columns.

MECHANICAL ENGINEERING, as steam engines, hydraulic motors, the construction of tools, machinery, mill-work, etc.

AGRICULTURAL ENGINEERING, as the application of machinery to agricultural processes, and the improvement of agricultural districts by drainage, and various other operations involving an acquaintance with engineering practices.

HYDRAULIC ENGINEERING, as in the planning and construction of water-works, and the improvement of rivers, harbors, etc.

MINING is a subject that receives equal attention with Engineering. The various interests involved in the mining operations of the country, as

THE COAL TRADE,
THE METAL TRADE,
and MARKET REPORTS,

wherever they affect these subjects, are fully cared for, while the principles which relate to mining, geology mineralogy, chemistry, and metallurgy are carefully elaborated, and all new discoveries relating there promptly detailed. In the practical departments relating to the working and management of mines, whether of gold, silver, copper, lead, iron, coal, slate, marble, stone, oil, salt, etc., will be found, not only the latest news, but a full discussion of the best methods of developing these important interests and bringing their products into marketable shape.

The ENGINEERING AND MINING JOURNAL is not strictly a new periodical, as for nearly four years it has occupied a prominent position in the field of journalism under the title, THE AMERICAN JOURNAL OF MINING, which is now presented re-modeled, improved, and in a new and more attractive form.

CONTRIBUTORS.

Among its Contributors will be found some of the ablest men of the day, and no effort or expense will be spared to make the information conveyed, FRESH, TRUSTWORTHY, AND THOROUGH.

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Subjects requiring the aid of engravings will be fully illustrated by cuts prepared by the best artists. Great pains will be taken in this department.

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THE ENGINEERS' AND MANUFACTURERS' PUBLISHING COMPANY.

The Annual meeting of the Stockholders of this Company was held on Monday, May 1st, and adjourned till Monday May 15th, in order to give Stockholders due notification.

The adjourned meeting will be held at the office of the company at three o'clock P. M.

A full attendance is desired as business of importance will be brought up for consideration and action.

R. W. RAYMOND, President.
WM. VENTZ, Secretary.

WILLIAM R. TAYLOR,

Kings County Steam Boiler Works,

MANUFACTURER OF

High and Low-Pressure Steam Boilers.

ALSO,

TAYLOR'S PATENT UPRIGHT RETURN TUBULAR BOILERS,

TANKS, GASOMETERS, SUGAR PANS, COOLERS,

OIL-STILLS AND OIL-TANKS.

ALSO,

ANDERSON'S Improved Machine for

GRINDING SEATS OF VALVES.

Nos. 345 and 347 First Street,
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near North-Fourth, (P. O. BOX 213.) Brooklyn, E. D.
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PATENT IMPROVED
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FOR CUPOLA FURNACES AND FORGES.

Also manufacturer of the Sturtevant Patent Improved Fan Blower and Exhaust Fan. Send for illustrated catalogue.
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For Raising Heavy Weights, such as Locomotives Boilers, Guns, Heavy Machinery, Wrecking Purposes, putting together Water and Gas Pipes, pushing off Cranks and Propellers, Pulling, Proving Chains and Ropes, setting up Rigging, or Pulling Stumps, Punching and Shearing Iron, Die-Sinking, etc.

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PATENT HYDRAULIC PUNCH,
For Punching Iron, Die-Sinking, etc. Ap 12;1y

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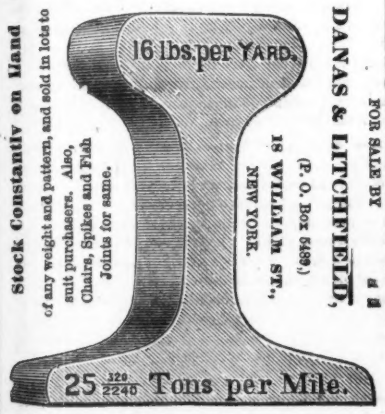

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Railway & Machinists' Supplies,
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Also Agents for
LINDSAY WRENCHES,
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STEAM and WATER GAUGES,
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Iron and Brass Castings, Forgings, Boilers, and Machinery.

Sole Manufacturers of the celebrated LOOMIS STEAM ENGINE, with Patent Variable Cut-off by the Governor.
Jobbing and Repairs promptly attended to.
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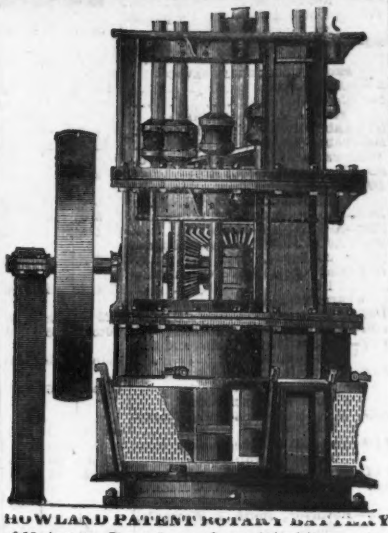
MINING MACHINERY OF ALL KINDS.
MANUFACTURED BY MOREY & SPERRY.



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Irons for the best California stamp mill, straight battery, complete. Also, Irons for low mortar, old style mill, and all other kinds.

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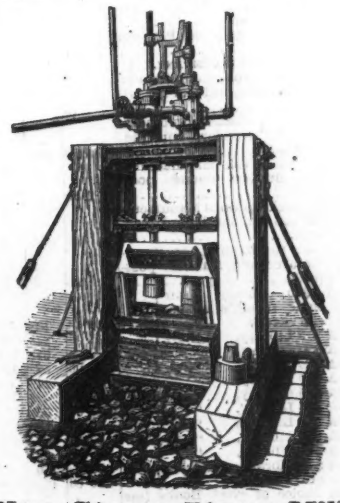
Steam Stamp-Mill Company,
OF PHILADELPHIA, PA.

Are now prepared to supply Miners and other parties with their



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AT THE SHORTEST NOTICE,

These Mills have now been in operation for upwards of a year, and have proved to be the most durable and efficient, as well as the lightest for transportation, of any mills now used. The valve gear is of the simplest and most durable construction, readily adjustable by movable cams on the piston rods or stamp stems, thereby giving the operator absolute control of the length and velocity of motion and force of the blow. These Mills are adapted for both dry and wet crushing, and for the hardest rock or softest cement. These Mills are every way equivalent to a Twenty Stamp Mill. For further particulars call on or address
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Concentration by means of Air

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The *MECHANICAL COMBINATIONS* are extremely simple, the machines therefore correspondingly durable. A continuous self-delivery of ore on one side and tailings on the other is effected, hence very little attention is required, except keeping the hopper supplied with ore The power of one man is sufficient to operate a mach in that will concentrate one ton per hour.

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Illustrated Circulars may be had on application to
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jan10;1y-is No. 210 Eldridge Street, N. Y.

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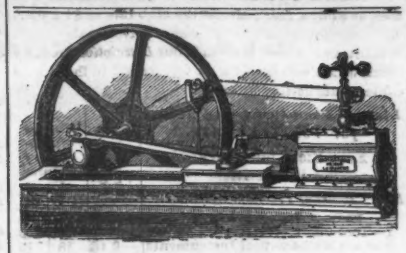

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Manufacturers of Stationary and Portable Steam Engines and Boilers; also Flax, Hemp, Tow, Oakum, and
ROPE MACHINERY,
MILL GEARING,
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Lathes, Planers, Drills, Chucks, etc. Iron and Brass Castings. Judson & Snow's Patent Governors constantly on hand.
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Bar Iron, Braziers' Rods, Wire Rods, Rivet and Machinery Iron, Iron and Steel
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RAILROAD IRON, COOPER WROUGHT IRON BEAMS AND GIRDERS,
Semi and Cast-Steel, Gun-Barrel and Compcnent Iron,
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Works at Trenton and Ringwood, N. J.
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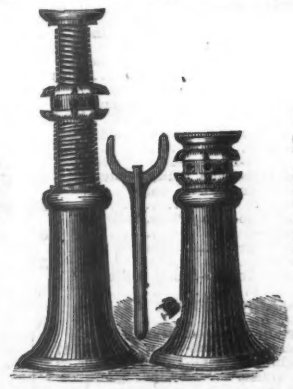
MANUFACTURER AND DEALER IN
Railway and Mining Supplies and Machinery.



Ball's Patent Telescope Jack.
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Aug 31-1y

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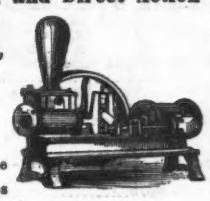
Patent Fly Wheel and Direct Action
STEAM PUMPS,
HAND PUMP AND STEAM ENGINE COMBINED.



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All sizes made to order at short notice.
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Four First Premiums, American Institute, 1870.
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MANUFACTURERS OF

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PORTER'S GOVERNOR,
The Allen Boiler, and
STANDARD STRAIGHT-EDGES,
Surface-Plates, and Angle-Plates.
Four First Premiums awarded at the Fair of the American Institute, 1870.
Send for an Illustrated Circular. dec1-1y

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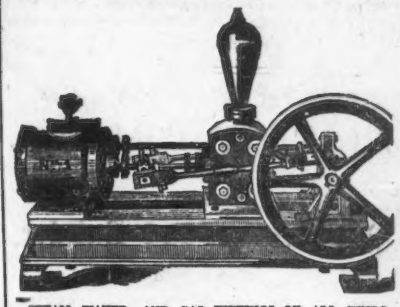
THE WOODWARD
Steam Pump Manufacturing Company
MANUFACTURERS OF THE
WOODWARD PATENT IMPROVED SAFETY
Steam Pump and Fire Engine.



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Also dealers in WROUGHT IRON PIPE, BOILER TUBES, etc. Hotels, Churches, Factories, and Public Buildings, heated by Steam, Low Pressure.

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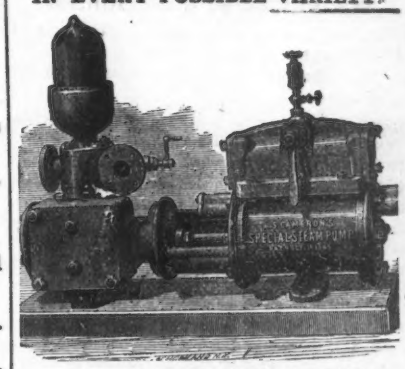
PUMPS
IN EVERY POSSIBLE VARIETY.



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FOOT 23d STREET, E. R.,
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GUILD & GARRISON, MANUFACTURERS OF

Steam Pumps,
Vacuum Pumps,
Steam Engines,
Vacuum Pans,
And all the various connections. For sale at the STEAM PUMP WORKS, 26, 28 and 30 First street, Williamsburgh, N. Y.
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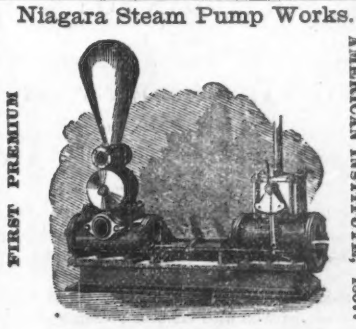
Niagara Steam Pump Works.



CHARLES B. HARDICK,
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Sole Manufacturer of
HARDICK'S PATENT DOUBLE-ACTING
Steam Pump and Fire Engine.
Patented in England, Belgium and France. Send for circular. feb-13-1y

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Corner of Pine and Nassau Streets, New York.
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☞ Interest allowed on Deposits. feb-1y

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AND COUNSELLOR-AT-LAW,
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Advice in Patent Law given free. mar 8:tf

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THE BEST IN THE MARKET.
USED BY
RAILROAD MANUFACTURING COMPANIES, ROLLING MILLS, AND UPON VEHICLES OF ALL KINDS.
SEND FOR CIRCULAR AND PRICE LIST.
DANIEL BIDWELL, MANUFACTURER,
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m:28:6mos NEW YORK.

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Princely Premiums for Great Efforts,

And

GENEROUS RETURNS FOR THE SMALLEST FAVORS.

Almost anything in the world, great or small, that any body wants, can be acquired by canvassing for the

Manufacturer and Builder,

With less expenditure of time and labor, in most cases, than by any other method.

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Select Descriptive List of Hundreds of Rich Premiums,

It is only necessary to write to Western & Co., Publishers, 37 Park Row, New York, describing the COVETED ARTICLE, and special terms will be made for obtaining it as a Prize for Suscriptions; in most cases, terms that are equivalent to GIVING THE CANVASSER

NEARLY ALL HE CAN COLLECT,

As will be seen by examining the List.

In these days, CAPITAL is necessary for establishing the enormous circulation required to make a first-class periodical like THE MANUFACTURER AND BUILDER profitable in spite of its gigantic expenses. Capital is necessary to pay for the best productions of the best writers, for the costly designs and engravings, for the fine, thick paper, and for the extra style of printing, that make THE MANUFACTURER AND BUILDER the type of a new era in American polytechnic journalism. Capital is above all necessary to PAY THE ARMY OF CANVASSERS employed in bringing the merits and benefits of this journal home to the intelligent millions of the American people.

OUR PLAN FOR

1871

IS

CAPITAL WITHOUT STINT

For these purposes, and

MAGNIFICENT PAY

To all who help us.

We desire to pay out the coming year not less than a Quarter of a Million of Dollars from our receipts and reserves, for the services of Volunteer Agents alone, in all the States, Territories, and Provinces of North America. Our paper challenges comparison with the best Journals of Arts and Engineering in the world. It is at the same time one of the cheapest publications ever issued from the press; and to all its attractions we now add a range of Premiums tantamount almost to a free gift of our paper, our labor, our earnings, for the year, for the sake of introducing THE MANUFACTURER AND BUILDER to myriads of readers, whose patronage in future years will recompense our present lavish outlay.

For these premiums are to be not only offered, but **paid**; not only paid, but paid **promptly**, to the letter and spirit of the description, and to the satisfaction of all. Every premium is of the best and most desirable kind we can select, and from manufacturers whose names are a guarantee of excellence.

The premiums range from twenty-five cents to twelve hundred dollars in value—the prices annexed are in no case exaggerated, but the actual cash value invariably—so that one who aims at a large premium will not lose his labor even if obliged by any cause to suspend his efforts, because it is never too late to decide what premium to select, and no list is too small to earn a valuable prize, or rather a choice of many valuable prizes.

Every class of persons can share in this profitable employment, at times, in ways and in places suited to their circumstances, and with rewards adapted to their different desires.

You never know what you can do until you Try.

Thousands of persons, of both sexes, once straitened and perplexed to get a living, have suddenly found out hat they had the gift to **get rich by canvassing!** Study the nature of the business, and particularly human nature; study the arguments and inducements or subscription to THE MANUFACTURER AND BUILDER, ay your plans well, and get every body to help you, and hen let nothing discourage or stop you.

In t following table is given the price of each arcle, and the number of subscribers required to get free, at $1 50 a year; also at the club rate of $1 a year. The descriptions of a few articles are given in the fourth column, the balance is given in our *Descriptive Premium Sheet*, which will be sent on application to those who contemplate getting up clubs.

List of Premiums and Terms for Vol. III., 1871.

A Free Field for Everybody. No Competition.

No.	Names of Premium Articles.	Price of Premium.	Number of Subscribers required at $1 50	at $1
	FROM PATTERSON & BROS.			
1	Tool-Chest	$45 00	60	190
2	Case Mathematical Instruments	9 00	18	55
3	Case Mathematical Instruments	15 00	22	75
4	Pocket Knife	1 50	4	21
5	Pocket Knife	2 00	5	22
6	Pocket Knife	2 50	6	25
7	Lady's Pocket Knife	2 00	5	22
8	One dozen Knives and Forks	14 00	21	70
9	One dozen Knives and Forks	18 50	27	90
10	One dozen Knives and Forks	22 00	33	110
11	One dozen Knives and Forks	25 50	39	124
12	Carver and Fork	5 00	13	37
13	Fluted Sharpening Steel	2 50	6	25
	FROM HALL, ELTON & CO.'S PLATE.			
14	One dozen Tea-spoons, medallion	5 75	14	40
15	One dozen Table-spoons, medallion	12 00	19	65
16	One dozen Table Forks, medallion	12 00	19	65
17	Butter-Knife, medallion, solid	1 00	4	
18	Soup-Ladle, medallion	5 75	14	40
19	Ice or Water-Pitcher, No. 3	17 00	26	80
20	Pocket Fruit-Knife, No. 12	2 00	5	22
21	Revolving Butter-Cooler, No. 80.	8 00	16	52
22	Cake-Basket, No. 1867	10 00	18	58
23	Caster, 6 bottles, chased, No. 2039	9 25	18	54
24	Fruit-Basket, No. 200	13 50	21	75
25	Child's Cup, No. 041	2 75	6	25
26	Knife, Fork, and Spoon, child's set, morocco case	3 00	8	30
27	One dozen Napkin-Rings, medallion	9 00	17	54
28	Tea Set, gold lined, No. 1822	48 00	52	180
29	Tea Set, No. 1866	36 00	45	135
	FROM COLBY BROS. & CO.			
30	Knife-Cleaner	75	2	
	FROM MABIE, TODD & CO.			
31	Gold Pen and Pencil, rubber case	8 00	15	45
32	Gold Pen and Pencil, rubber case	6 75	13	37
33	Gold Pen, silver or gold holder, in box	4 25	9	32
34	Gold Pen, extension gold case, in box	20 00	29	90
35	Lady's Gold Pen, ivory holder, in box	2 75	6	25
	FROM HENRY RUSSELL & CO.			
36	Downer Mineral Oil Lamp, No. 1956	4 75	10	35
37	Downer Mineral Oil Lamp, No. 1955	9 25	17	56
	FROM C. F. A. HEINRICH.			
38	St. Germain Student Lamp, largest size	8 25	15	45
	FROM FAIRBANKS & CO.			
39	Family Scales	14 00	21	70
	FROM COLBY BROS. & CO.			
40	Clothes-Wringer	7 50	10	35
	FROM ALEXANDER M. LESLEY.			
41	Refrigerator, the Zero, No 38	38 00	42	142
42	Cooler, the Newport, No. 1	12 00	15	45
43	Hot-Air Coal Furnace, the Gothic, No. 9	125 00	135	450
44	Hot-Air Wood Furnace, Gothic, No. 10	150 00	162	525
	FROM THE STANLEY RULE & LEVEL CO.			
45	Iron Smoothing-Plane, Bailey's patent	5 00	13	37
46	Iron Smoothing-Plane, Bailey's patent	6 50	14	42
47	Iron Jack-Plane, Bailey's patent	7 50	15	47
48	Iron Fore-Plane, Bailey's patent	9 00	17	55
49	Iron Jointer-Plane, Bailey's patent	10 00	18	58
50	Wood Smoothing-Plane, Bailey's patent	3 00	8	30
51	Wood Fore-plane, Bailey's patent	4 50	10	35
52	Wood Jointer-Plane, Bailey's patent	75	12	36
53	Wood Jointer-Plane, Bailey's patent	50	14	40
	FROM POST & GODDARD.			
54	Machinists' Hand-Taps	17 60	25	75
55	Machinists' Hand-Taps	52 20	65	220
56	Machinists' Hand-Taps (your choice)			
57	Screw-Plates and Dies, size A	5 00	12	37
58	Screw-Plates and Dies, size B 1	8 00	15	45
59	Screw-Plates and Dies, size C 1	10 00	18	58
60	Screw-Plates and Dies, size D 1.	13 00	20	70
61	Tap-Wrenches, size A	3 00	7	25
62	Tap-Wrenches, size B	4 00	9	30
63	Tap-Wrenches, size C	5 00	12	37
64	Set of 11 Taper Shank-Twist Drills, No. 1	19 75	29	90
65	Set of 29 Drills, straight shank, mounted, No. 9	12 00	18	60
66	Set of 60 Drills, steel wire gauge from 1 to 60, No. 12	8 00	15	45
67	Set of 21 Taper-Shank Drills, No. 3	44 00	58	175
68	Set of 9 Bit-Stock Drills, 1-16 to ½ in.	2 80	6	25
69	Self-Centering Drill-Chucks, Beach's patent, for jewelers, No. 0	10 00	18	58
70	Self-Centering Drill-Chucks, Beach's patent, for drilling, No. 0	7 00	14	40
71	Self-Centering Drill-Chucks, Beach's patent, 0 to 3-16, No. 1	6 00	13	38
72	Self-Centering Drill-Chucks, Beach's patent, 1 to 60 S. W. E., No. IX	7 00	14	40
73	Self-Centering Drill-Chucks, Beach's patent, 0 to ½, No. 3.	14 00	23	77
74	Drill-Grinding Machine, No. 1	10 00	18	58
75	Drill-Grinding Machine, No. 2	20 00	30	95
76	Auger-Bits, your choice of 4 sets	— —	—	—
	FROM L. W. POND.			
77	Foot-Lathe, No. 1	50 00	65	204
78	Foot-Lathe, No. 2	30 90	47	124
	FROM COLBY BROS. & CO.			
79	Miniature Steam-Engine and Boiler	1 36	5	23
	FROM RUSSELL & SPEIR.			
80	Steam-Engine (1 H. P.) and Boiler	300 00	310	1125
81	Steam-Engine (3 H. P.) and Boiler	600 00	640	3250
82	Steam-Engine (5 H. P.) and Boiler	800 00	858	3000
83	Steam-Engine (10 H. P.) and Boiler	1200 00	1285	4500
84	Steam-Pump, C. B. Hardick's, No. 0	120 00	155	540
85	Steam-Pump, Cameron & Co.'s, No. 1	150 00	192	675
86	Steam-Pump, Cameron & Co.'s, No. 2	200 00	257	900
87	American Submerged Pump	12 00	19	65
	FROM GEORGE TALLCOT.			
88	Turbine Water-Wheel, Reynold's, 12 in.	105 00	125	360
89	Turbine Water-Wheel, Reynold's, 24 in.	226 50	270	800
90	Turbine Water-Wheel, Reynold's, 36 in.	384 50	460	1350
91	Rotary Blower, Root's patent, No. 1	350 00	405	275
92	Rotary Blower, Root's patent, No. 2	80 00	105	420
93	Portable Forge, Root's patent, No. 1	48 00	65	260
94	Portable Forge, Root's patent, No. 3	80 00	105	420
	FROM THE AMERICAN SAW CO.			
95	Circular Saw	125 00	135	473
96	Cross-Cut Saw	6 60	14	42
	FROM A. P. & M. STEPHENS.			
97	Labor-Saving Vise, 2-in. jaw	4 00	9	32
98	Labor-Saving Vise, 4½-in. jaw	12 00	28	58
	FROM THE STANLEY RULE & LEVEL CO.			
99	Boxwood two-foot Rule	2 50	6	25
100	Silver-Plated Triangular Drawing-Scale	6 00	16	52
101	Pocket Sheet-Metal Gauge	5 00	13	37
102	Arkansas Oil-Stone	1 75	5	22
103	Arkansas Oil-Stone, mahogany case	3 25	8	30
104	Gear or Cog-Wheel Calculating-Rule	4 00	12	36
	WESTERN & COMPANY'S AGENCY.			
105	Preparing and Filing a Caveat	25 00	28	80
106	Application for a Patent	30to40	35	100
107	Application for Patent and first Government fee	46to56	50	150
108	Application for Patent and all Government fees	66to76	75	250
	FROM J. W. HUTCHINSON.			
109	English Breech-loading double-barrel Gun	100 00	110	350
110	English Muzzle-loading double-barrel Gun	75 00	85	250
111	Breech-loading Rifle, the Allen	30 00	46	150
112	Revolver, Smith & Wesson's, No. 1½	12 50	19	65
113	Revolver, Smith & Wesson's, No. 2	15 00	22	75
	FROM MASON & HAMLIN.			
114	Melodeon, portable, No. 1, 4 octave	50 00	66	200
115	Melodeon, resonant, style G, 6 octave	170 00	146	510
116	Pipe-Organ, church use, style No. 29	675 00	579	2000
	FROM J. S. & C. ODELL.			
117	Pipe-Organ	500 00	430	1500
118	Pipe-Organ	700 00	600	2100
119	Bradbury Square Piano-Forte, No. 4	650 00	430	1500
120	Steinway's No. 1 Grand Piano	1200 00	860	3000
	THE AMERICAN WATCH CO., WALTHAM, MASS.			
121	Silver Watch	20 00	32	100
122	Silver Watch	35 50	48	142
123	Gold Watch	50 00	65	200
124	Lady's Gold Watch	100 00	110	350
	FROM THE UNITED STATES WATCH CO.			
125	Silver Watch	40 00	50	150
126	Silver Watch	66 00	75	275
127	Gold Watch	100 00	100	300
128	Silver Watch	104 00	104	312
129	A Sewing Machine (your choice)	65 00	65	200
	FROM MCALLISTER.			
130	Microscope and 48 objects	10 00	14	40
	FROM COLBY BROS. & CO.			
131	Velocipede for Boys	16 00	16	52
	FROM MCALLISTER.			
132	Magic-Lantern, No. 433	20 00	30	95
	FROM H. THOMPSON.			
133	An Easy Chair			
	FROM D. APPLETON & CO.			
134	New American Cyclopædia, 16 vols	80 00	80	213
	FROM G. & C. MERRIAM.			
135	Webster's Unabridged Pictorial Dictionary	12 00	15	45
136	Webster's National Pictorial Dictionary	6 00	10	35
	FROM WESTERN & COMPANY.			
137	One back vol. Manufacturer and Builder, unbound, post-paid	1 75	6	25
138	Two back volumes Manufacturer and Builder, unbound, post-paid	3 50	11	37
139	One back vol. Manufacturer and Builder, bound, post-paid	2 50	9	32
140	Two back volumes Manufacturer and Builder, bound, post-paid	5 00	18	58
141	Cover for binding the Manufacturer and Builder, post-paid	60	3	21
142	A $10 Library (your choice from list in special sheet),	10 00	18	58
143	A $15 Library,	15 00	24	85
144	A $20 Library,	20 00	31	106
145	A $25 Library,	25 00	38	125
146	A $30 Library,	30 00	44	144
147	A $35 Library,	35 00	50	162
148	A $40 Library,	40 00	56	177
149	A $45 Library,	45 00	62	192
150	A $50 Library,	50 00	68	207
151	A $60 Library,	60 00	80	237
152	A $75 Library,	75 00	100	282
153	A $100 Library,	100 00	125	360
154	A choice of good Books (see terms in another column)			
155	A choice of convenient Book-Cases (see special sheet)			
156	A choice of popular Music (see terms in special sheet)			
157	A choice of Games and Toys, (see terms in special sheet)			

All paid through by mail or express.

We have taken especial pains to select in making up our price list the NEWEST and very BEST articles. No charge will be made for boxing or packing any article on our list. The Premiums, Nos. **4** to **7** inclusive, **31** to **35** inclusive, **75**, **99**, **101**, **105** to **108** inclusive, **121** to **128** inclusive, **137** to **141** inclusive, **154**, **156**, **157**, will each be delivered FREE of charge by mail or express (at the Post-office or express office nearest recipient) to any place in the United States or Territories. The other articles cost the recipient only the freight after leaving the manufactory of each, by any conveyance specified.

As an aid to those who engage upon large clubs, we will count subscriptions by *one* individual for 1869, 1870, and 1871, as *three* subscribers toward a premium. Every *new* subscriber should have the work from the beginning. Bound volumes may be counted in the same way—each as one subscriber—except, of course, when they are obtained as a premium.

Do not fail to note the following Points:

1. All subscribers sent by one person count, though from one or a dozen different post-offices. But

2. State with each name or list of names sent that it is for a premium.

3. Send the names as fast as obtained, that the subscribers may begin to receive the paper at once. You can have any time, from one to six months, to fill up your list.

4. Send the exact money with each list of names, so that there may be no confusion of money accounts.

5. Old and new subscribers all count in premium clubs, but a portion, at least, should be new names; it is partly to get these that we offer premiums to canvassers.

6. Specimen numbers, cards, and show-bills will be supplied free, as needed by canvassers; but they should be used carefully and economically, as they are very costly.

7. Remit money in Checks on New York banks or bankers, payable to order of WESTERN & COMPANY, or send Post-Office Money Orders. If neither of these is obtainable, Register Money Letters, affixing stamps both for the postage and registry; put in the money and seal the letter in the presence of the postmaster, and take his receipt for it. Money sent in any of the above ways is at our risk.

DESCRIPTIVE LIST OF PREMIUMS.

Every Premium in the annexed list is described in the December MANUFACTURER AND BUILDER, *and also in a* **Special Descriptive Sheet,** *which will be sent free to every one desiring it. We have room here for the following only:*

No. 1—Chest of Good Tools.—We are able, through the special favor of Messrs. Patterson Brothers, of 27 Park Row, to offer chests of the very finest quality of tools, of kinds and prices named below. Similar tools could be purchased for half the money; but these are all A No. 1, for practical use, and worth a dozen common articles. For this we have the guaran- of Messrs. Patterson, which is amply sufficient for us, and for all who know them. Any of these tools may be ordered of them. We make up only a single premium, which contains a full assortment for all common purposes. The tools are of regular size, and but few additions would be required for a journeyman carpenter. The assortment we offer is as follows: 1 tool-chest, $8; 1 jack-plane, $1 75; 1 smooth-plane, $1 50; 1 fore-plane, $2 25; 1 handsaw, 22 in., $1 75; 1 compass saw, 10 in., 50c.; compass, 6 in., 37c.; 1 adze-eye hammer, No. 4, $1 25; 1 hatchet, No. 2, 90c.; 1 draw-knife, 7 in., $1 12; 1 try-square, 6 in., 70c.; 1 bevel, 8 in., 75c.; 1 chalk-line and spool, 30c.; 1 mallet, 30c.; 1 pair of pliers, (steel,) 5 in., 60c.; 1 pair of calipers, 4 in., 30c.; 1 brace, No. 2, $2 25; 1 auger-bit, ea., ¼ in., 30c.; ½ in., 32c.; ¾ in., 45c.; 1 in., 60c.; 1 centre-bit, ea., ½ in., 21c.; ¾ in., 23c.; 1 in., 25c.; 1¼ in., 35c.; 1½ in., 40c.; 6 gimlet-bits, assorted, 90c.; 3 gimlet-bits, assorted, 33c.; 1 screw-driver bit, 25c.; 1 flat countersink, 25c.; rose, do., 25c.; snail, do,, 25c.; 1 octagon reamer, 30c.; 1 taper-bit, 30c.; 1 screw-driver in handle, ea., 3 in., 30c.; 6 in., 50c.; 1 gouge in handle, ea., ½ in., 50c.; 1 in., 70c.; 1 chisel in handle, ea., ¼ in., 30c.; ½ in., 35c.; ¾ in., 40c.; 1 in, 50c.; 1¼ in., 60c.; 1 framing-chisel, ea., ¾ in., $1; 1 in., $1 10; 1¼ in., $1 20; 1 auger, ea., ¾ in., 70c.; 1 in., 80c.; 1¼ in., 90c.; 1 set brad-awls in handles, $1 35; 1 rule, 2 feet, 25c.; 1 saw file, ea., 4 in., 14c.; 5 in., 17c.; 1 flat bastard file, 8 in., 30c.; 1 wood-rasp, 50c.; 1 soldering copper, 60c.; solder nails, etc., $1 25;=**$45 00.**

Nos. 2, 3—Mathematical Instruments for Draughting, Drawing, Etc.—Very convenient not only for architects and mechanics, but for boys and girls. These are neatly fitted in beautiful rose-wood cases, having dividers with flexible joints, and points, semi-circles, pencil and penholders, rulers, etc., etc. All the pieces in No. 2 are finished in brass and steel; those in No. 3 are German-silver and steel. The pieces are the same in each, but No. 3 is of extra beauty and workmanship. 18 subscribers at $1 50 each secures No. 2, and 22 at $1 50 each, No. 3.

Nos. 4, 5, 6, 7—Pocket Knives.—Here's for th boys and girls. These premiums are among the most pleasing and useful that we have ever offered. Every boy, and girl too, wants a pocket knife. We give them an opportunity to obtain a most valuable one for merely a little effort. These knives are from Messrs. Patterson Bros. No. 4 is a neat, substantial knife, with three blades and buck-horn handle. No. 5 is a still finer article, with four blades and buck-horn handle. No. 6 is an elegant knife, with four blades and shell handle. No. 7 is a lady's pocket-knife, a beautiful article, with four blades and shell handle.

Nos. 8, 9, 10, 11, 12, 13—American Table Cutlery.—We are glad to be able to offer really good articles of American manufacture, such as are competing successfully with the best foreign goods. ***Messrs. Patterson Bros., 27 Park Row,*** who supply us with these articles, are also importers of English goods. They recommend these knives, manufactured by the ***Meriden Cutlery Co.,*** as equal to any cutlery in the market, and their recommendation is a guarantee wherever they are known. We offer four kinds knives, and three sizes of each kind. No. 8 have rubber handles, which are actually boiling-water-proof, so that, if they were accidentally to remain in it for several minutes, or even hours, they would not be injured, The blades are of the best steel, and warranted Dessert size, with forks, sold at $14. For 23 subscribers at $1 50, or 78 at $1, we will give either the medium size or the table size, sold at $15 50. No. 9 have ivory handles, are selected with great care, have steel blades, and are beautiful goods. Dessert size, with forks, sold at $18 50. For 31 subscribers, at $1 50, or 100 at $1, we will send the medium size, sold at $20 50. For 34 at $1 50, or 112 at $1, we will send the table size, sold at $22 50. No. 10 are made of solid steel, and are triple plated all over with pure silver, which will wear for a long time, while the knife is actually indestructible by ordinary use. Dessert size, with forks, sold at $22. For 37 subscribers, at $1 50, or 118 at $1, we will give the medium size, sold at $24 50. For 38 at $1 50, or 120 at $1, we will send the table size, sold at $25. For 38 at $1 50, or 120 at $1, we will send the table size, sold at $25, No. 11 have steel blades, triple-plated with silver, and larger ivory handles, and are really splendid goods. Dessert size, with forks, sold at $25 50. For 42 subscribers, at $1 50, or 128 at $1, we will give the medium size, sold at $28. For 45 subscribers at $1 50, or 143 at $1, we will give the table size sold at $30 50. The forks, which accompany these premiums, Nos. 8, 9, 10, are made of genuine albata, and warranted double-plated with coin-silver. The forks with No. 11 are warranted triple-plated with coin-silver. These forks are also furnished to us by Messrs. Patterson Bros. The carving-knife and fork, and fluted steel, are made by

the Meriden Cutlery Co., with the best ivory balanced handles.

Nos. 14 to 29—Silverware for the Table.—What would become of elegance and refinement in the furnishing of homes if the ladies (God bless them!) had not such an amiable passion for endlessly beautifying everything around them? Ever since Eve first set out the fruit of Paradise on its broad leaves to entertain the angel guests of Adam, it has been the province of her lovely daughters to spread the social board with attractions still more tempting to the eye than to the palate. What, that becomes a woman, will not a woman do to make her table shine? We condole with them that their means are not always equal to their good taste, and propose that henceforth no lady shall lack a lustrous silver tea-set, or other piece of similar elegance, unless she chooses to. Look at the following premiums, all of the celebrated manufacture of Messrs. HALL, ELTON, & Co., 36 Park Row, New York; No. 28 is silver-plated, gold-lined, beautifully chased **Tea Set** of six pieces, consisting of a coffee-pot, two tea-pots, a creamer, a sugar-bowl, and a slop-bowl. The style of this set is very neat, new and elegant. Messrs. Hall, Elton & Co, warrant these goods to be their best triple plate. This is a very desirable premium. No. 29 is a tea-set with same number of pieces, triple-plated, plain, new style.

Nos. 31, 32, 33, 34, 35—GOLD PENS, Rubber Mounted with Ever-Pointed Pencils—Pens in Gold and Silver Holders—Pens and Pencils in Extension Cases.—No. 31 has a gold-mounted rubber case, with pencil, and a No. 4 gold pen, manufactured by MABIE, TODD & Co., 180 Broadway, New York. This and the next, No. 32, are, we think, really the best things of the kind manufactured. The fact that hard rubber is used, shows that the gold for the mountings, etc., is of the finest quality, as rubber, on account of the sulphur contained in it, can not be mounted with any other without tarnishing. When closed, the pencil No. 31 is only 5 inches long, (No. 32, 3½ inches,) but it opens to a length of 5¼ inches. The price for the holder and pencil of No. 31 is $6, pen $2; and of No. 32, or smaller size, $5 for the case, and $1 75 for the pen. Fifteen subscribers will give you the former, or gentleman's size, and 13 the latter, or lady's size. No. 33 is a No. 6 gold pen, with silver or gold-plated holder with an ebony handle—a very neat, desirable business-pen. By describing the kind of pen you prefer, we can probably select one that will suit your hand perfectly. We send these by mail, in a neat turkey morocco box, lined with velvet, in which they can be kept, protected from injury, No. 34 is a large pen, in a fine extension case, round or fluted, and richly engraved. The gold is 14 carats fine. These pens, which are nicely put up in boxes, are a very beautiful thing for a present. Price $20, and sent, postage paid, to any address, upon receipt of 29 subscribers at $1 50 each. No. 35 is a lady's gold pen, with ivory holder. Price, $2 75. This is indeed a very neat and beautiful pen for ladies' use. We send it, postpaid, by mail, inclosed in a handsome velvet-lined morocco box, for 6 subscribers.

No. 38—The Celebrated St. Germain or German Student's Lamp.—as it is sometimes called. This lamp is made and furnished to us by C. F. A. HENRICHS. It scarcely needs eulogium, being the standard thing in our leading colleges, both among students and professors. They reject gas, even where it is most plentiful and convenient, and save their much-worked eyes by the motionless pure white light for which this lamp is so remarkable. No other artificial illumination approaches so nearly to the still colorless sunlight. The secret is in the scientific adaptation of burner and chimney to produce that perfection of draught by which absolute combustion is attained without vibration. The porcelain shade softens the light most agreeably. The lamp slides on a vertical standard, and is adjusted by a set-screw at any desirable elevation to accommodate the work or the eyes. The reservoir is elevated above and at a short distance from the burner, (communicating by a pipe,) so that the oil is always cool and out of reach of flame. The reservoir can be taken out of its telescopic socket, and carried away to another room and filled and returned, without putting out the light. The lamp will be a treasure worth no little trouble to obtain to any one who needs strong light, or who values eye-sight, economy, neatness, pure air, and freedom from trouble and annoyance with lamps; as in all these points it is without a peer. The price of these lamps is $8, with 25 cents for packing. The mineral sperm oil can be had from most respectable dealers, or ordered in packages of any size (1 gallon upward) from Messrs. HENRY RUSSELL & Co., 33 Park Place, New-York.

No. 39—Family Scales.—These scales combining the advantages of counter and platform scales, are peculiarly adapted to household purposes. They weigh from ½ ounce to 240 lbs. They have a scoop or pan for weighing flour, sugar, and other house stores, and a platform for heavier articles, and are just such an apparatus as is needed for in-door or out-door use, occupying less than two feet square. These scales are manufactured by the well-known FAIRBANKS & Co., No. 252 Broadway New York, whose weighing apparatus has long ranked as the standard in all parts of the country. Send to them for circulars, if desired.

Nos. 45-53—Bailey's Patent Planes.—To those who have used these planes and know their value, it is but small praise to say that they are superior to any others made. They are so far ahead of any others that there can be no comparison between them. They are self-adjusting in every respect. Both the wood and iron planes are entirely independent in themselves, requiring neither hammer, screw-driver, nor wrench to replace or adjust the cutter, which is held firmly in place and can be instantly released by use of the cam and its thumb-piece. The cutter is adjusted by simply turning a thumb-screw under the bed-piece upon which the plane-iron rests. By this the cutter can be adjusted to any thickness of shaving. The Stanley Rule and Level Co., 55 Chambers Street, New York, warrant these planes to be of the best stock and finish. The various numbers and sizes of these planes which we offer give carpenters, mechanics, and others desiring them, an opportunity to get a complete set of either the wood or iron planes as premiums. The smooth planes, of which we offer two sizes, are 5½ inches long, 1¾ inch cutter; and 8 inches long, 1¾ inch cutter.

Jack plane..	14	in. long, 2	in. cutter.		
Fore "	18	" " 2⅜	" "	}	Iron.
Jointer "	22	" " 2⅜	" "		

In the wood planes the lengths and widths of cutter embrace all sizes made. Forty-four subscribers at $1.50 each, or 141 subscribers at $1 each, will get a complete set of the wood-planes. Sixty-nine subscribers at $1.50 will get a complete set of the iron planes, which will last a life-time. If larger sizes than those given are wanted, a few extra subscriptions will be required, according to the difference in the price.

Nos. 54-76—Machinists' Tools.—This series of premiums, consisting of machinists' tools, etc., has been selected and put up at the suggestion of several practical men with whom we have consulted in regard to the subject. These gentlemen, who have a practical knowledge of the tools, and of the requirements of all who have any thing to do with the working of metals, give their unqualified approval of the tools we have selected. This list of premiums has been made so extensive that every man who has any industrial operations to carry on will find some tool or tools absolutely necessary to him. By sending us clubs of subscribers to THE MANUFACTURER AND BUILDER these tools may be obtained by the smallest possible amount of labor. Of the qualities of these tools, in point of finish, we know them to be the best in the market—the best, without challenge. When a man has a set of any of them in his tool-chest, he knows he has the means of producing work equal to any that can be done. We obtain these tools from the general agents, Messrs. POST & GODDARD, 109 Liberty Street, New York.

No. 77—Foot-Lathe No. 1.—Of these useful articles we offer two kinds. No. 1 is perfectly adapted for most kinds of turning in wood or metals; also drilling, boring, polishing, sawing, etc. It seems to be the size desired by most people. This is proved by the great numbers of them sold. This lathe takes a piece between centres 19 inches long and 6¼ inches wide in diameter. It weighs 200 pounds. It is fitted with two pointed centres, one spur-centre, face-plate turned and polished, two rests, one 9 and the other three inches long; also centre key and wrench combined, which fits the screw heads in different parts of the lathe. The balance-wheel weighs 45 pounds, is turned true, and is polished. It has two sizes for change of speed. This size of lathe has a great many extra parts made for it, so that whenever they are wanted they can be obtained. This is a very valuable point, as in buying other machines of the kinds only such things as happen to fit can be used, and they are not always to be found when wanted. The Rev. JOHN TODD, D.D., speaking of lathes, says in regard to these, "For price, for finish, for beauty and workmanship, I have never seen any American lathe so desirable. Of the No. 1 he says: "Nobody can own the lathe without daily gratitude." We procure these lathes through Mr. LUCIUS W. POND, 98 Liberty street, the well-known manufacturer of machinists' tools. Few people can obtain one of these lathes more easily than by obtaining 65 subscribers for THE MANUFACTURER AND BUILDER, for which we ship this premium, without any additional charge for boxing. The regular price is $50. We include leather belt 8 feet long, which costs 90 cents in the price given in the table.

No. 78—Foot Lathe, No. 2.—Our subscribers are frequently asking for second-hand lathes, saying at the same time that such a one would answer their purpose, and probably come cheaper. There are many others who do not care for so complete a lathe as No. 1. The No. 2, we think, will answer this demand. It is made of cheaper materials, but in the same style as lathe No. 1. The frame is of wood, with curved legs, which give it a neat and attractive appearance. It is painted and ornamented in the best style. The bed is made with iron slides three feet long. Will take a piece between centres 21 inchhes long and 6¼ inches in diameter. It has an iron pulley like No. 1. The spindle runs accurately. The face-plate takes off, and the centres are fitted to tapering sockets. Tailstock spindle traverses with a left-hand screw. Everything is well fitted and finished. The balance-whee is the same pattern as for lathe No. 1, and is turned true. The lathe, with face-plate, long and short T rests, two pointed centres, spur-centre, and wrench, packed for transportation, costs $30. For this we also include the leather belt, 8 feet long, which is used on the driving wheel. We box this lathe and deliver it on the cars for a club of 47 subscribers at $1 50 each, or 124 at $1. The twist-drills and chucks—premiums 65, 66, and 69 to 73—especially the smaller sizes, are just the things for these lathes. The chucks, No. Ox, 2 and 3, cost $2 extra for fitting in the lathe. Those desiring further information in regard to the premium may send to WESTERN & Co., 37 Park Row, New York, for an illustrated pamphlet.

No. 79—The Dollar Steam-Engine.—This is a real working steam-engine and boiler, which runs half an hour, or until its fill of water is evaporated, by means of a small spirit-lamp, which forms a part of it. It can not explode or get out of order. A most instructive as well as entertaining toy. Sent, prepaid, for 5 subscribers at $1 50. It is manufactured by COLBY BROTHERS & Co.

Nos. 80, 81, 82, 83—Compact and Powerful Portable Steam-Engine and Boiler.—BAXTER'S patent is acknowledged by many experienced engineers to be the most perfect combination, of standard principles exclusively, and thorough workmanship, ever made in a portable engine. At the same time such is its compactness and the scale and system on which it is manufactured, (by the Colt Armory, at Hartford, Ct.,) that it is afforded at the lowest price ever known for the same (actual) power. It is made by machine tools constructed expressly for it, of standard interchangeable parts throughout, like the celebrated American watches. Consequently we are able to make it one of our most attractive and valuable premiums. Besides, it is warranted to consume less fuel per horse-power than any other engine. This is in consequence, partly, of the improved arrangement of the boiler and the cylinder being entirely let into the steam-space, to save room and heat. The one-horse engine and boiler (which, like the others, will run above, not below rated power) stands but five feet high, over all, by two feet in diameter. This is premium No. 80, costs $300, and can be had for 320 subscribers at $1 50 each, or 1125 at $1 each. The five-horse engine and boiler stands 6¼ feet high by 3 feet in diameter, costs $800, and can be had for 858 subscribers at $1 50 each. The ten-horse engine costs $1200, and will run a good sized manufactory. There is now no reason why any body should be without a first-class steam-engine, especially as these engines are so simple, snug, safe, and economical of fuel that they can be run in any apartment by the fire required to warm it, and by and person of common intelligence, and will be received from the factory in perfect readiness for use. For running small lathes, drills, etc., circular and scroll saws, printing-presses, corn-huskers, cider-mills, fanning-mills, feed-mills, cotton-gins and hullers, cheese-presses, churns, pumps, washing-machines, sewing-machines, rotary blowers for forges and other purposes, etc., the smallest of these engines will be found thoroughly effective, and as little incumbrance and trouble as a kitchen stove. For business, however, we recommend to try for one of ample rather than of bare sufficiency.

Nos. 84, 85, and 86—Steam-Pumps.—These steam-pumps are of the best class and quality, economical in the use of steam, and capable of being applied in various ways. No. 84 is one of Hardick's manufacture, which took the first prize at the Fair of the American Institute a year ago. Nos. 85 and 86 are two sizes of the celebrated Cameron pump. Nos. 1 and 2. The first has a steam cylinder 4½ by 7 inches, and its capacity of ordinary speed is 15 gallons per minute, and costs $150. Size No. 2 has a steam cylinder 6 inches in diameter, with 8-inch stroke. It costs $200, and is capable at ordinary speed of delivering 30 gallons of water per minute. These pumps are remarkable for their compactness, simplicity, and durability. The valves are large and not liable to become choked up. By simply removing the bonnet, access can be had to them for inspection or repair,

Nos. 105 to 108—To Procure a Patent without Money.—We have met with many having valuable inventions, which inventors are anxious to get patented, but are unable to afford the expense, and consequently fail to secure the profits which a patent might produce. To such as are in this position, we make the following liberal offer: No. 108—We will prepare an application for a patent, attend to its passage through the Patent Office, and pay all government fees and incidental expenses attending the same, for any inventor presenting a patentable invention, who will get up a club of seventy-five subscribers for THE MANUFACTURER AND BUILDER for one year at $1,50 each, or 250 at $1 each, and send us the money by post-office order. If this application should be rejected, they may send us an additional list of thirty subscribers at $1.50 each, and the subscription money for the same, on receipt of which we will prepare and prosecute a second application, paying all government fees and incidental expenses. No. 107—For a list of fifty subscribers at $1.50 each, or 150 at $1 each, with the cash accompanying it, we will prepare an application, attend to its passage through the office, and pay the government fee ($15), the applicant paying the second government fee of $20. No. 106—For a list of thirty-five subscribers at $1.50, sent in the same way, we will prepare and prosecute an application, the applicant paying the government fee. No. 105—for twenty-eight subscribers at $1.50 each, or eighty at $1 each, we will prepare and file a caveat, furnish the necessary drawings, (which we also furnish in all the above cases), and pay all government fees. All cases placed in our hands under these arrangements will receive our best attention, equally with those for which our fees have been paid in cash, and will be appealed to the Board of Examiners-in-Chief if necessary, the applicant paying the government fee of $10 on such appeal. If the inventor has no model to accompany his application, he may procure additional subscribers, the premium on which (see cash rates) will enable him to pay for the model. A club of 100 names has been obtained in a single establishment where from 150 to 200 hands are employed. A village of 500 inhabitants will take this number readily.

No. 129—Sewing Machines.—Your choice! A $65 machine for 65 subscribers, at $1.50 each.—It makes no difference to us which machine we send, or whether it is selected at first or at the last moment. No charge for boxing the machines; they go safely as freight. For circulars, giving full particulars in regard to style of machines, fixtures, etc., as well as instructions, send to **Grover & Baker Manufacturing Co.**, 495 Broadway, New York; **Florence Sewing Machine Co.**, 505 Broadway, New York; **Wilcox & Gibbs Sewing Machine Co.**, 658 Broadway, New York; **Singer Sewing Machine Co.**, 458 Broadway, New York.

Nos. 137, 138—Volumes of the Manufacturer and Builder.—The unbound volumes of THE MANUFACTURER AND BUILDER consist of a set of numbers for a year, each separate in its own paper cover. These volumes amount to a valuable Library on all matters pertaining to the Industrial Arts, and contain more varied information on manufacturing, building, and mechanical subjects than can be obtained in books costing three times as much. The price of the volumes unbound is $1.50 each, at the office, or $1.75 if sent by mail, as they must be post-paid. They are profusely illustrated, the engravings used in them having alone cost thousands of dollars. For ordinary use, the sets of numbers unbound will answer quite well.

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No. 154—General Book Premium.—Any one sending twenty-five or more names may select books from our list to the amount of ten cents for each subscriber sent at $1; or thirty cents for each name sent at $1.20; or sixty cents for each name at $1.50. *This offer is only for clubs of twenty-five or more. The books will be sent by mail or express, prepaid through by us.*

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" " " 20 "	10 00	
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" " " 40 "	24 00	4 00
" " " 50 "	32 50	7 50
" " " 75 "	48 75	11 25
" " " 100 "	65 00	15 00
" " " 200 "	140 00	40 0
" " " 500 "	350 00	100 00
" " " 1000 "	700 00	200 00

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" "	30	" "	40..	95	"	"	
" "	40	" "	50..	90	"	"	
" "	50	" "	200..	85	"	"	
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The Profits of the Cash Business, it will be seen by the above tables, are large and accrue rapidly. Every experienced canvasser knows that it is far easier to obtain 4 subscribers to a paper like THE MANUFACTURER AND BUILDER at $1 50 each than to get 1 subscriber to a high-priced magazine, costing $6. This is more strikingly evident when the fact is taken into consideration that our paper, costing only $1 50, is ACTUALLY SUPERIOR IN EVERY RESPECT TO ANY THING OF THE KIND IN THE COUNTRY COSTING TWICE THAT SUM.

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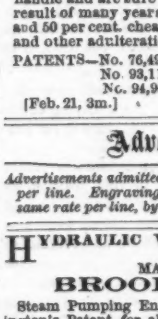

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PATENTS—No. 76,499, April 7, 1868.. No. 96,465, Nov. 2, 1869.
No. 93,113, July 20, 1869 No. 106,606, Aug. 23, 1870. Address GEORGE N. MOWBRAY,
No. 94,969, Sept. 21, 1869 No. 106,607, Aug. 23, 1870. NORTH ADAMS, MASS.

[Feb. 21, 3m.]

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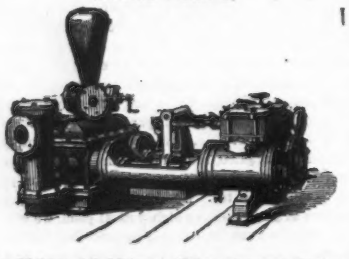

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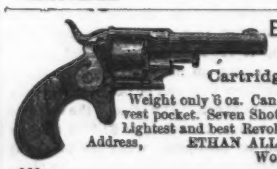

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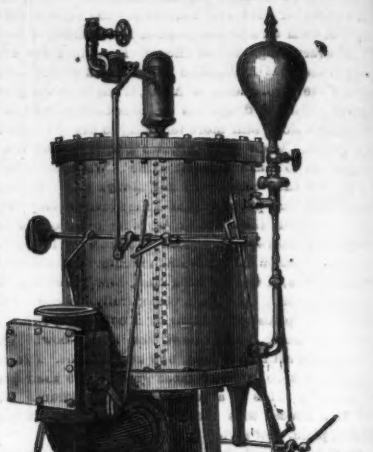

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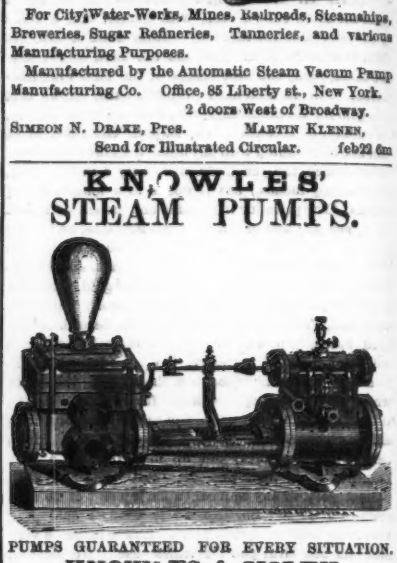

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